Report of the Work of The Rubber Research Board in 1951

(*Established under the Rubber Research Ordinance Chapter* 302)

June, 1952

Report of the Work of The Rubber Research Board in 1951.

The present report is the twenty first annual report of the Rubber Research Institute of Ceylon as constituted under the Rubber Research Ordinance and amended by the Rubber Research (Amendment) Acts No. 27 of 1948 and No. 30 of 1951.

CHAIRMAN'S REPORT

Chairman.—Mr. F. H. Griffith, M.P. functioned as Chairman until his retirement and Mr. W. A. Paterson was appointed with effect from 8th October, 1951.

Board Membership.—The following changes in the membership of the Board occurred during the year :—

Mr. R. H. Wickremesinghe, C.C.S., Controller of Establishments, was nominated to represent the Minister of Finance in place of Mr. W. J. A. Van Langenberg with effect from 14th March.

Mr. Francis Amarasuriya was on leave from 6th June and Mr. D. E. Hettiarachi, J.P., U.M. was nominated to act for him until his return.

Mr. W. A. Paterson was nominated to act for Mr. F. H. Griffith who was on leave from 6th April until 10th August.

Major T. F. Jayawardena, M.P. was nominated to act for Major Montague Jayewickrema, M.P. with effect from 2nd July until his return.

At its meeting of 5th November the Board passed a vote of thanks to Mr. F. H. Griffith for his valuable services as a member for 21 years and as Chairman since June 1950.

The personnel of the Board at the end of 1951 was as follows :—

Ex-Officio Members :—.

The Director of Agriculture — Dr. A. W. R. Joachim.

The Director, R.R.I.C. — Dr. H. E. Young (Vice Chairman).

Representing the Minister of Finance — Mr. R. H. Wickremesinghe, C.C.S.

Nominated Members :—

Representing the Senate — Senator C. Wijesinghe.

Representing the House of Representatives — Major Montague Jayawickrema, M.P.

Representing the Smallholders — Mr. F. A. Obeyesekera.

Representing the Planters' Association of Ceylon — Mr. W. A. Paterson (Chairman) and Mr. R. J. Hartley.

Representing the Low-Country Products Association of Ceylon — Mr. J. L. D. Peiris and Mr. Francis Amarasuriya.

Meetings of the Board were held on 7th February, 20th March, 29th May, 20th August, 3rd September and 5th November.

Committees :—

Experimental Committee.—The Experimental Committee was reconstituted to consist entirely of members of the Board and the following members were nominated to the Committee with effect from 20th March :—

Mr. F. H. Griffith (Chairman)
Mr. Francis Amarasuriya
Mr. F. A. Obeyesekera
Mr. J. L. D. Peiris
Dr. A. W. R. Joachim
The Acting Director (Dr. H. E. Young).

Mr. W. A. Paterson and Mr. D. E. Hettiarachi acted for Mr. F. H. Griffith and Mr. Francis Amarasuriya respectively while these gentlemen were on leave.

Meetings of the Committee were held on 15th May and 29th September.

London Advisory Committee for Rubber Research (Ceylon and Malaya).—The Board contributed jointly with the Rubber Research Institute of Malaya to the cost of research on the quality and utilisation of raw rubber carried out at the Imperial Institute, London, under the control of the London Advisory Committee for Rubber Research (Ceylon and Malaya).

Meetings of the Committee and the Technical Sub-Committee, were held on 16th March, 30th March, 28th June, 6th July, 24th October and 2nd November.

Development.—The name of the institution was changed from Rubber Research Scheme (Ceylon) to Rubber Research Institute of Ceylon with effect from 1st September 1951, the necessary legislation being provided by the Rubber Research (Amendment) Act No. 30 of 1951.

FINANCE.

Income.—The Board's main income was derived from the cess on exports of rubber under Section 6(1)a of the Rubber Research Ordinance. Income from this source exceeded the estimate for the year by Rs. 147,575/:.

Monthly cess collections were as follows :—

			Brought forward		Rs. 669,428
January	...	Rs. 158,912	July	...	„ 64,832
February	...	„ 142,760	August	...	„ 68,053
March	...	„ 118,461	September	...	„ 97,055
April	...	„ 76,597	October	...	„ 136,741
May	...	„ 91,233	November	...	„ 92,134
June	...	„ 81,465	December	...	„ 128,132
Carried forward		Rs. 669,428	Total		Rs. 1,256.375

A profit of Rs. 210,300/- was derived from the normal working of Dartonfield Group.

Expenditure.—Current expenditure amounted to Rs. 798,746/-. The surplus of income over expenditure for the year was therefore Rs. 908,366/-.

Capital expenditure amounting to Rs. 251,254/- was incurred during the year, the main items being Agricultural Development Rs. 82,390/-, Laboratory Equipment Rs. 32,518/-, Motor Vehicles Rs. 40,628/-, Renovating Buildings Rs. 11,789/-, Water and Power Supply and Indoor Sanitation Rs. 11,886/-, Club House and New Buildings Rs. 57,141/-.

Accounts.—The accounts for the year with a Balance Sheet showing the property and liabilities of the Board will be prepared and submitted to the Auditor General for examination.

Technical Reports.—The Director's report, which embodies the reports of the other officers, is attached.

(Sgd.) W. A. PATERSON,
Chairman of the Board,
Rubber Research Institute of Ceylon.

19-2-1952.

DIRECTOR'S REPORT FOR 1951

By

H. E. Young.

General.

The year was marked by fact that the staff position became very satisfactory as all vacancies in the technical service were filled and in addition a fully qualified Estate Superintendent took up duties.

In addition a further three graduate Research Assistants commenced duties.

The staff for the year was made up as follows :—

Senior Staff	...	...	8
Intermediate Staff	...	...	7
Junior Staff	...	...	63
Minor Staff	...	...	25
Labour (average)	...	...	360

With a full cadre work in all departments was placed on a sound footing during the year and much of the new equipment ordered was obtained although a considerable amount of the technological apparatus required for the classification of rubber is still outstanding as well as the spectrophotometer ordered for the Agronomy Department.

Replanting of old rubber lands at Dartonfield Division with test material and clearing and planting of jungle land with further experimental stocks at Hedigalla Division was proceeded with and a number of manurial trials on commercial estates were commenced. Existing experiments were continued.

The reference library was improved through the acquisition of the services of a Librarian and cataloguing and indexing was commenced and periodicals books etc. necessary for the work of the staff obtained.

The building of two new Junior Staff Bungalows was commenced as well as a Club House and contracts were let for the erection of two Intermediate type bungalows. New labour lines were also provided for and renovation of other buildings where necessary carried out.

The services of the Small Holdings Department were amplified by the organization of co-operative latex centres whereby small holders were assisted to form groups in order to sell their latex to the Ceylon Latex Corporation . Co-operative sheet centre societies were further developed and the general advisory, soil conservation, and plant supply services continued.

Staff.

Dr. E. Phillis, Ph.D., D.Sc., Director, resigned in February.

Dr. H. E. Young, D.Sc., Agr., Oidium Research Officer, was appointed Acting Director. He was confirmed as Director in September and was on duty throughout the year and also carried out the duties of Oidium Research Officer and Mycologist.

Mr. C. A. de Silva, B.Sc., C.D.A., Botanist was on duty throughout the year.

Mr. W. I. Pieris, B.A., Small Holdings Propaganda Officer was on duty throughout the year.

Mr. C. D. de Fonseka, A.C.C.A., A.C.C.S., Secretary Accountant proceeded on four months end of contract leave during the year and commenced a new contract.

Dr. E. J. Risdon, M.A., D.Phil., A.R.I.C., commenced duties in London in January and took up duty at Dartonfield in April.

Mr. G. W. D. Barnet, Estate Superintendent commenced duties in February.

Mr. D. H. Constable, M.Sc., D.I.C., A.R.C.S., took up duties as Agronomist in April.

Ir. J. H. Van Emden, Holland, took up duty as Mycologist and Oidium Research Officer in December.

Mr. D. M. Fernando. B.Sc., (Mycology Department) was awarded a Technical Aid Scholarship and proceeded to Mc.Gill University Canada for further training in Plant Pathology in July.

Messrs. A. J. Jeevaratnam, B.Sc., Agr., P. W. W. de Silva, B.Sc., Agr. and S. Natesan, B.Sc., B.Sc., Agri., took up duties as Research Assistants in January and were attached to the Agronomy, Botany and Chemistry Departments respectively.

The Director (as Vice Chairman) attended all meetings of the Board of management and acted as Chairman during the three months leave of the Chairman. He also served on the Experimental Committee.

He served as a member of the Rubber Advisory Board, of the General Committee of the Planters' Association and of the Committee of the Kalutara District Planters' Association as well as a member of the Central Board of Agriculture. Meetings of the Inter Departmental Committee for Land Utilization were also attended as well as several District Planters' Association and Agency Section Meetings.

Considerable time was also devoted to work entailed as a member of the Committee for the Agricultural Industries Section for the Colombo Plan Exhibition to be held in 1952.

Publications.

During the year the following publications were issued :—

Report of the work of the Rubber Research Board in 1950.
Combined Quarterly Circular for 1949.
Advisory Circular No. 29 — Manuring and Related Problems in Rubber.
Advisory Circular No. 30 — Fertilisers for Rubber.

Detail of progress.

A summary of the work of each department for the year is given hereafter under each departmental heading.

Research Laboratories,
Dartonfield,
Agalawatta.
25th February, 1952.

REPORT OF THE CHEMIST FOR THE YEAR 1951

By

E. J. Risdon.

Section 1 — General.

The Chemical Department reopened with the arrival of the Chemist at the end of April. The staff of the department consists of the Chemist, the Research Assistant, Mr. S. Natesan, and two Laboratory Assistants, Messrs. Muthukuda and Veerabangsa. Arrangements to recruit the extra personnel necessary for the work on the technical classification of rubber have been made with the Director. Where appropriate the services of the Rubber maker are utilized with the co-operation of the Estate's Superintendent.

Owing to the lack of continuity in the Chemical Department in the last few years, much time has had to be spent in training the staff of the department in their work and also in checking the stocks of laboratory apparatus and chemicals. While it is hoped that, in future stock taking and checking will not be so prolonged, considerable time will have to be spent training personnel to use the new equipment as it becomes available. The lack of continuity of equipment and of up-to-date literature abstracts in the department have had an appreciable influence on the type and volume of work which the department can undertake effectively.

The advisory services of the department previously handled where practicable by other departments have been handed back to the Chemist. As might be expected a very large portion of the Chemist's time is spent dealing with the advisory services and the technical literature.

The department has obtained an electrical calculating machine for statistical analysis and the Senior Laboratory Assistant is being trained to carry out some of the analyses.

Letters outgoing (excluding Roneoed Letters and Pamphlets)	420
Roneoed Letters and Pamphlets	8

Visits by the Staff of the Chemical Department.

To R.R.I.C. Estates	To other Estates	Other Visits	By
3	30	16	Chemist
—	4	2	Research Assistant
—	—	2	Laboratory Assistants.

A number of the visits to estates involved inspection of almost all the factory and the provision of a detailed report thereon.

Acknowledgement is made to the officers of the London Advisory Committee for Rubber Research (Ceylon and Malaya) who carried out all the experimental testing described in Section 5 of this report. Their assistance to the department in completing experiments, designed in Ceylon, is appreciated.

Section No. 2 — Latex.

1. **Equipment.**—The machinery and equipment for many of the standard latex tests e.g. KOH number, mechanical stability, sludge content etc. has not yet arrived. The necessary items are however expected in 1952. No flame or other spectrophotometer will be ordered until after the arrival of the instrument selected by the Agronomist. Small scale laboratory mills for the determination of d.r.c. are available.

2. **Determination of the d.r.c. of Ammoniated Latex.**—The R.R.I.C. previously agreed to act as arbitrators in the case of disputes between the sellers of ammoniated latex and the Latex Corporation of Ceylon and immediate steps to train an assistant at the R.R.I.C. had to be taken. At a later date an exchange of visits of one of the Laboratory Assistants at the Latex Corporation's premises and at the R.R.I.C. took place. The British Standards Institution in B.S. 1670 : Part I : 1950 describes a method for the determination of d.r.c. involving the use of 2% acid and a modification whereby 'it is permissible' to use .5% acetic acid. A further method involving 5% acid has previously been employed at the R.R.I.C. The Latex Corporation favoured the use of the 2% method for concentrated ammoniated latex and the .5% method for freshly ammoniated latex. (Early information from Malaya e.g. Malayan Agric. J. 1927 XV No. 1 pp. 6 suggests that, under certain conditions, coagulation with more concentrated acid can give a higher d.r.c.).

Accordingly, five samples of creamed concentrate and six of freshly prepared ammoniated latex have been analysed for d.r.c. by each of the three methods in duplicate. For the samples of creamed latex, the analysis of variance suggests that neither the differences between duplicates nor the differences between test procedures are significant in comparison with the interaction samples x tests (20 degrees of freedom). For the samples of ammoniated latex, the analysis of variance suggests a significant difference between the duplicates but none between the test procedures. It is therefore concluded that with the ammoniated latex used the choice of procedure amongst the three employed is not vital, or that the experiment has not been sufficiently accurately performed. Confirmatory tests on this point and on whether the difference between methods depends upon the time interval between ammoniation and testing are in hand. From the evidence available at the time the R.R.I.C. tentatively agreed to use the B.S.I. .5% method for the d.r.c. of freshly ammoniated latex, especially as it had been suggested that the R.R.I. of Malaya may have found quite recently that this method gives the higher d.r.c.

3. **Effect of Ammoniation on the d.r.c. of latex.**—Some estates as well as smallholders sell their ammoniated latex to the Latex Corporation of Ceylon and to other companies equipped with machinery for concentration. Payment appears to be made on the basis of the d.r.c. of a sample taken and analysed by the buyers. From the correspondence it appeared that certain estates may have used their input figures of fresh latex as a guide to the total d.r.c. of ammoniated latex without invariable agreement and with a tendency to blame the ammoniation or the d.r.c. method for any

discrepancy. Eventually, one buyer and an agency house raised the subject of the effect of ammoniation on the d.r.c. The agency house suggested that in their opinion a difference of at least 1% between the d.r.c. of fresh and ammoniated latex might be observed implying that a difference of this order might be found within a very few days of ammoniation.

The latter suggestion is not in agreement with the technical literature, principally Malayan, which could be found at the time. From this literature it appeared that immediately following ammoniation there may be a significant drop in d.r.c., but this may be followed by a definite peak (within 1 to 2 days), prior to a gradual fall. Since no recent data with Ceylon latex had been observed it seemed desirable to check the effect of ammoniation on d.r.c. in Ceylon using latex from one of the estates in question as well as from the R.R.I.C. Five samples of latex selected on different days from the R.R.I.C. (3) and from an outside estate (2) have been analysed in triplicate for d.r.c. before ammoniation, almost immediately (within forty minutes) after ammoniation and on the 3rd, 10th, 17th and 24th days after ammoniation. The latex has been ammoniated to 0.5% using a concentrated ammonia solution and the fresh latex sample diluted with an equal weight of water. The d.r.c. of the ammoniated latex has been determined by the method of B.S. 1670 : Part I : 1951 with the modification of Section 1.33 but using 2% acid. and the d.r.c. of the fresh latex by an analogous procedure using as coagulant 1 fluid ounce of acetic acid (added as 1% solution) per 10 to 11 lbs. d.r.c. Taking the means of the five latex samples, a slight rise in d.r.c. (0.17) is shown on ammoniation, at the 3rd day the rise is higher (.355) and between the 10th and 24th it appears to fall towards zero The detailed analysis of variance suggests that of the principal effects (variations between samples, between times of testing with respect to ammoniation and between replicates) only the variation between samples is significant at $P = .05$ in comparison with any of the first or second order interactions. Not one of the first order interactions appears significant in comparison with the second order interaction. The tentative conclusion is that although ammoniation may cause an apparent rise in d.r.c. followed by a fall, the observed differences are not invariably significant at least in the early stages of storage ; possibly this is due to different behaviour of different samples of latex, but this is not supported by the numerical value of the appropriate interaction (samples x times of test).

The Agency House has therefore been informed that their view that there appears to be a difference of at least 1% in the d.r.c. between fresh and ammoniated latex' is not substantiated in our tests unless the time interval between testing is prolonged well beyond the usual three or so days. Later confirmatory tests, which are still in progress, do not appear to disagree with our views.

The criticism of these tests that the methods of d.r.c. determination for fresh and ammoniated latex are different is normally unavoidable as the volume of acid used for ammoniated latex is usually quite unsuitable for fresh latex. However triplicate determinations of the d.r.c. of five samples of ammoniated latex by BS 1670 : Part I : 1950 (2% acetic acid) and by the use of about 1 oz. of acid (suitably diluted) per 10 to 11 lbs. d.r.c. have been made. In the latter case extra heating appeared desirable and a coherent coagulum could not be obtained at all readily. The analysis of variance suggests that the latter method gives a significantly ($P = .01$) higher mean value than the former, the difference being of the order of 0.34%. This implies that if the d.r.c. of ammoniated latex could be determined by a method analogous to that used for fresh latex the numerical value of the d.r.c. (ammoniated) would be increased i.e. the value d.r.c.

(fresh) — d.r.c. (freshly ammoniated) might be significantly negative. This method appears scarcely practicable for routine determination for ammoniated latex.

4. **Determination of d.r.c. general.**—From the R.R.I.C.'s correspondence it is aparent that the method employed for check determinations of d.r.c. vary between estates. As a preliminary investigation therefore it seems desirable to make a survey of the influence of some of the more important variables on the results. Work is in progress on this subject.

At a later date a brief summary of parts of the detailed data mentioned in this section may be submitted to the Editor of the Quarterly Circulars for publication under the names of the participants.

Section No. 3 — Smoked Sheet.

1. **Mould on RSS.**—Inquiries about the most suitable means of supresing mould growth on RSS have been received from two Colombo packing houses, one of which is reported to be prohibited by municipal regulations from erecting a smoke house. Reference to a number of other packing houses showed that the arrival of mouldy RSS at the packing house is not rare in Ceylon. The preferred procedure for mould suppression is washing, dripping and resmoking, although at least one packer used p. nitrophenol as a dipping agent for this purpose.

The published work of the R.R.I.C. clearly suggested that .1% p. nitrophenol either added to latex or used as a dipping solution for freshly machined, undried sheets imparted considerable protection to RSS. No data on the use p. nitrophenol for fully smoked RSS has been observed so far amongst the early work of the R.R.I.C. Accordingly, the London Advisory Committee was asked whether, in it's opinion, consumers of RSS would be likely to find the presence of p. nitrophenol deleterious with their compounding techniques. On the receipt of the necessary information, replicated comparative tests involving the exposure in three places of samples of mouldy and fresh RSS as washed and unwashed sheets dipped in varying concentrations of certain readily available fungicidal chemicals (including p. nitrophenol) have been carried out against controls and resmoking for periods upto 24 hrs. As a result of these tests the packers concerned have been informed that under our conditions of test p. nitrophenol appeared quite suitable for application to old washed RSS and can give better protection than resmoking for upto 24 hrs. One sample of laboratory p. nitrophenol appeared defective, but melting point determinations showed that it is not normal commercial p. nitrophenol.

A packer's objection that p. nitrophenol dipped RSS had to be air dried to be effective has been investigated. In our tests oven drying the washed sheets at about 51°C (124°F) for 1.5 to 2.5 hours did slightly decrease the protection afforded by dipping sheets in .1% solutions of the chemical, but the samples are still superior to the controls and to resmoking. Our objection to p. nitrophenol is that the margin of safety is not large.

At present we are awaiting the arrival, from various chemicals manufacturers in the U.S.A. and the U.K., of small samples of suggested fungicides which will be tested as dipping agents at various concentrations, above and below .1% against p. nitrophenol and other controls. The necessary detailed literature search on the causes of mould and on its prevention on RSS and on other materials is in progress.

2. **Packing Smoked Sheet.**—There has been correspondence on this subject with the London Advisory Committee, who are represented on the recently set up Rubber Trade Association (U.K.) Joint Committee on

Marking and Packing Baled Rubber. From the available technical literature, it appears that a portion of bare-back RSS bales arrive at their destinations badly distorted and with illegible marks, and that in some quarters it is believed that this is due to inadequate pressing of the bales during process.

Visits to a limited number of packing houses suggested that the use of their equipment for prolonged pressing of RSS is comparatively rare, but nevertheless the numbers of complaints received was said to be small. A circular and questionnaire has therefore been sent to fifteen large Ceylon packers asking for details of their output, process and of the number of complaints about the distortion of bales and the illegibility of marks. The circular advised packers that any new packing specification designed to prevent bale distortion might well involve the purchase of a additional RSS baling boxes etc. Eventually, nine packers replied, of whom eight stated that they had no complaints of distortion against their products.

A summary of this information has been sent to the L.A.C. representative on the R.T.A. Joint Committee with the comment that, if the opinion of the Joint Committee members is not in agreement with the implications of the information provided by the packers, the R.R.I.C. would be pleased to receive suitable supporting evidence together with suggestions for improvements in packing.

Section No. 4 — Sole and Blanket Crepe.

1. **Bleaching of Latex by RPA.3.**—This process involves the addition to latex, containing its normal amount of sodium bisulphite, of an aqueous emulsion of Messrs. E. I. Du Pont De Nemours' proprietary compound RPA.3. The active ingredient of RPA.3 is believed to be xylyl mercaptan. The use of xylyl mercaptan and of a large number of other chemicals is covered by a patent issued on behalf of the R.R.I. of Malaya. The Director of the R.R.I.C. is empowered to issue provisional lincenses to employ the process in Ceylon. (The necessary chemicals are believed to be available through Messrs. Mackwoods Ltd., Colombo at Rs. 3·50/lb for RPA.3 and Rs. 8·50 lb. for Duponol OS less 5% in both cases in early December 1951).

Initially the R.R.I. of Malaya advised us to carry out the emulsification of the RPA.3 (20 parts) in 0.5% ammonium oleate solution (80 parts) but no ammoniumoleate could be obtained locally and the chemical had to be made in the laboratory. Later the R.R.I. of Malaya suggested that the oleate could be made in situ in the presence of excess ammonia. The emulsifier used in Malaya is the Hurrel Homogeniser, but the R.R.I.C. has no machine of this type and a small Premier Colloid Mill, designed for pastes, had to be used. The output of this machine is low, as the ingredients have to be passed about ten times rather slowly through the mill, further the stability of the resultant emulsion is limited. The various experiments designed to simplify and improve the above emulsification process had not been particularly fruitful until Duponol became available commercially in Ceylon.

Duponol OS is a 'fatty alcohol sulphate' composition suggested by Messrs. Du Pont de Nemours as a simple emulsifying agent for RPA.3. Detailed tests, comparing four different concentrations of Duponol per 100 of RPA.3 and per 400 of water using three methods of emulsification and carrying out all the tests with distilled and with tap water, showed that shaking 100 parts of RPA.3 with 5 parts of Duponol in 400 parts of water in a stoppered bottle can give a satisfactory emulsion. The emulsion is not stable indefinitely and should be reshaken immediately before use. At

present emulsion over about 2 weeks old is not normally employed without prior tests although most (but not all) samples seemed to be satisfactory at the end of about 6 weeks storage. In the above tests using Duponol the type of water had to be confounded with days of test, but other tests have not so far shown that the stability of the emulsion is adversely influenced by R.R.I.C. water. Emulsion prepared to the above recipe and added at the rate of 2 lbs. of RPA.3 per 1000 lbs. d.r.c. is quite as satisfactory at the R.R.I.C. as emulsion prepared with oleate.

The R..R.I. of Malaya suggested that the proportion of emulsion could be such that the weight of RPA.3 did not exceed 2 lbs./1000 lbs. d.r.c. The chemical could be employed with or without fractional coagulation made before or after the addition of the emulsion. Tests at the R.R.I.C. with 0.5 to 2.5 lbs. of RPA.3 per 1000 lbs. d.r.c. against unbleached budded latex controls have shown that the degree of bleaching depends upon the amount of RPA.3 added. Concentrations of RPA.3 above 2 lbs. per 1000 lbs. d.r.c. are believed to cause appreciable softening and samples within the range of concentrations 0-2.5 lbs. RPA.3/1000 lbs. d.r.c. have been sent to London for tests on this point with Ceylon Crepes and for 'freezing and thawing' tests. There is evidence that, for a particular cencentration of RPA.3 (over parts, if not all, of the range to 2.5 lbs./1000 lbs. d.r.c.), the colour of the finished crepe is not independent of the clone used. For this reason inter alia, every effort is made to persuade estates to test for themselves the most suitable concentrations of RPA.3 under their conditions. At the R.R.I.C. bulked budded latex can, under the appropriate conditions, be bleached by RPA.3 so that an unbleached grade 2 Sole Crepe normally becomes a grade 1 Sole Crepe. Fractional Coagulation together with the use of RPA.3 normally gives a substantial improvement in the appearance of the finished crepe and the highest quality water — white sheets have been obtained with a 20-30% fraction from bleached budded latex. Estates are always advised to test for themselves whether and when a fraction should be taken, and it has been noted that some estates prefer to make their No. 1 (not water-white) sole crepe using quite small concentrations of RPA.3 employed with the removal of a small fraction, upto say 10%. The latter procedure has the obvious advantage of conserving supplies of RPA.3 and is said to improve the colour holding qualities.

The colour of the finished crepe appears to depend on the quality of the water employed, as well as upon the mechanical factors such as the number of passes and the temperature of milling. At the R.R.I.C., standardisation with distilled or rain water is preferable to standardisation with tap water, and if no suitable quality water is available the standardisation is omitted. In the case of the water used for emulsification the differences are smaller since the weight of water involved is not large. The significance of water will no doubt vary from estate to estate, and estates are advised to satisfy themselves about the quality of their water. Tests designed to ascertain whether the effect of tap water could be attributed to the influence of iron in the water showed that amounts of soluble ferric iron of the order of .01% on the d.r.c. could produce a slight discolouration especially in the presence of ammonia. Addition of upto .01% of citric and tartaric acids to repress the effects of iron and oxidation respectively did not improve the appearance of the bleached crepe.

According to the literature from Malaya, 0.4 – 0.5% of sodium bisulphite should be added to the latex, but from a copy of the patent application it appeared that the addition of bisulphite might be optional. Tests on this point have invariably indicated that the bisulphite is necessary and that from the viewpoint of colour, a slight excess is not disadvantageous. Tests on the use of various other chemicals and processes designed, inter

alia, to suppress the action of oxidising enzymes and micro-organisms have not so far shown any valuable positive results. The treatments included the use of alkalis, warming the coagulum and the addition of certain soluble organic and inorganic compounds.

A large scale trial in May at an outside estate showed that a portion of the bleached old seedling latex gave crepe of a grey-brown tinge. Later tests with old seedlings latex suggested that in the presence of RPA.3 the colour of the crepe may be more dependent on the weather than with budded latex and that RPA.3 may not, at one fixed concentration be as effective on slaughter tapped as on normal tapped old seedling latex. Unfortunately, both these conclusions must be treated with reserve for reasons connected with the design of the experiment e.g. in the latter case treatments and trees have to be confounded and in the former a proportion of slaughter tapped latex is included. The lack of unslaughter-tapped old seedling trees at Dartonfield renders experiments on normal seedling latex difficult.

Information from London and Malaya suggests that molecular oxygen is necessary for RPA.3 to carry out its bleaching action. Tests in which latex has been mechanically aerated for varying periods (1-10 mins.) immediately after addition of the RPA.3 showed little effect on the colour of the crepe. The use of Laundry Blue (Reckitts Robin Ultramarine) to mask any residual yellowness of the bleached crepe has been investigated the concentration to be employed appears to be critical, thus .01% on the d.r.c. gives a slight blue tint whilst .001% is without much apparent effect on the colour using 2 lbs. of RPA.3/1000 lbs. d.r.c.

The salient portions of much of the above have been circulated via the P.A. and L.C.P.A., and it is understood that Messrs. Du Pont de Nemours have advised Messrs. Mackwoods Ltd. to submit their advisory circulars on this subject to the Director of the R.R.I.C. The programme for 1952 may include further tests with seedling latex and further observations on the causes of discolouration before and during storage of bleached crepe.

2. **Lamination of Sole Crepe Laces.**—Generally laces are laminated by passing them two to four times through a special cool laminating mill, but a visit to an estate (in the Matale District) showed that the latter had exceptional difficulty in laminating it's sole crepe laces without preheating. As experiments at the estate showed, this preheating caused an increase in colour. The Superintendent of the estate, the late Mr. D. C. Gordon Duff, considered that the difficulty arose through some abnormality in the factory water. Since this point had never been proved to the satisfaction of his superiors, the R.R.I.C. undertook an investigation of the subject. A circular asking for details of other estates with this difficulty has been sent to Agency Houses.

Inspection of the process employed at the factory (wet process) disclosed no abnormal procedures believed to be likely to interfere with the lamination. Tests on air-dried sole crepe laces exchanged between the estate and the R.R.I.C. showed that R.R.I.C. laces could be laminated without heat at the estate but not vice versa, disclosing no fault in the estate's lamination procedure. A corresponding exchange of latex failed to give any useful data due to breakage of the containers. Portions of the estates dried laces treated as coagulum for the wet process or as intermediate stage laces of the intermediate process (that is given six or more rollings on rough rollers, followed by two rollings on smooth rollers in all cases under water) at R.R.I.C. produced laces capable of lamination without heat. This experiment did not show any evidence in support of

the view that the latex had abnormal properties. Finally arrangements made at the estate permitted the use of rain water on the last mill, and the Superintendent reported that one pass with rain water on at the rate of about 1.3 gallons per lb. d.r.c. per 0.4 minutes gave adequate lamination without heat.

Since the above experiments supported the view that the poor lamination is a result of the quality — chemical or microbiological — of the milling water, partial inorganic analyses have been made by the Agronomist. The analyses showed that the total solids content of this estate's water exceeded the average of that of seven estates in the Kalutara and Galle Districts by a factor of about 12. The corresponding ratio for calcium contents appeared even higher. Small scale tests designed to ascertain which of the inorganic constituents of milling water can interfere with the lamination are being carried out by soaking R.R.I.C. laces in distilled water, containing the desired chemical, for varying periods of time, prior to drying and laminating. The information at present available definitely suggests that, under the appropriate conditions quite small concentrations of calcium and of other ions can seriously interfere with the lamination.

The programme for 1952 requires further work to ascertain more information on the causes of poor lamination without preheating at the appropriate estates and on alternative means of inducing the necessary 'tackiness', with a view to obtaining an estimate of the cost of circumventing this defect.

Section No. 5 — Compound Rubber (a) Technical Classification.

1. **Equipment.**—The equipment and chemicals which the London Advisory Committee have been requested to obtain has not yet all arrived in Ceylon. Of the items specifically ordered for experiments in connection with the Technical Classification of Natural Rubber only B.R.P.R A. Strain Tester is fully assembled. The two-daylight press is in position, but neither the piping necessary for conversion from series to parallel heating nor the thermograph is available. The major parts of the mill are expected shortly, but there will be a delay awaiting the arrival of the starter device. The Arca pressure regulator has recently arrived but is not yet assembled. Some of the smaller accessories are being constructed here, others such as milling knives have been received from the London Advisory Committee whilst yet others such as the rolls pyrometer are not on board. While it is difficult to make estimates of the time when the R.R.I.C. can commence it's experiments, training the personnel in the use of the equipment can probably begin by mid 1952.

2. **General.**—Although the rate of delivery of equipment has been little disappointing, much time has of course been spent by the Chemical department and by the technical officers of the London Advisory Committee (on behalf of the R.R.I.C.) arranging and checking the orders and delivery schedules of the equipment. Until the R.R.I.C. can undertake it's own testing the London Advisory Committee have kindly offered their services. Their capacity is limited, but with the approval of the Director this offer of assistance has been gratefully accepted with a view to furnishing at least some preliminary data.

The background of technical classification (with reference to Ceylon) has been partially covered by a special issue of the Quarterly Circular in 1950, by Dr. Phillis' report on his visit to a conference in Malaya in September 1949 (Circulation Paper No. 1510) and by other papers e.g. Circulation Paper No. 1560. Thus natural rubber, possibly because it is regarded by it's producers as an agricultural product rather than as a

chemical product of agriculture, is one of the few major commodities sold on appearance rather than solely on technical qualities of value to the manufacturer. Furthermore natural rubber is criticised on the grounds of variability in certain of its technical properties. Initially the producers research organisations, realising their inability at that time to control many of the technical properties of natural rubber, decided to 'label' the average value of certain properties of what they considered the smallest unit of rubber of interest to the manufacturers i.e. the bale in the case of RSS. The properties selected originally i.e. the Mooney viscosity and the modulus determined under carefully controlled conditions, are those still in use at present. For both properties three classes have been defined and appropriate marks are placed on the bales of RSS. In practice, this may be regarded as defining the limits of the centre class of each property and allocating a further class mark to rubber above and another to rubber below the limits. Since the introduction of this classification system much information has appeared in the technical literature, but in spite of some changes the basic principles have remained the same. The present tendency is to 'play down' the Mooney classification as the value of this to the manufacturers is still not fully ascertained.

3. **Experiment T.C.B. 1 (29 Estates x 1 day).**—Late in 1950, Dr. Phillis circularized the management of about forty estates engaged in the production of RSS requesting them to supply twelve quarter sheets each from one day's production. The sheets for subsampling should have been selected by taking the x/24th, 3x/24th and 5x/24th etc. sheets where x is the estimated output of sheets. Estates could reject the appropriate sheet if they thought it incorrectly dried or very dirty, but selection of good sheets only has been discouraged. Twenty nine estates sent samples to the R.R.I.C., but since one estate sent samples from three divisions and another from 2 divisions the effective number of 'estates' is therefore thirty two. The bulk of the samples arrived at the London Advisory Committee premises at the end of March 1951.

The tests carried out on the samples included scorch, hardness and resilience as well as the standard raw Mooney, modulus (M 600 mean circumference 40' at 127°C) and strain (40' at 140°C, corrected to Vc 40). For the latter two tests the thirty two parcels have been broken down into one hundred and three lots of mainly 3 quarter sheets giving a minimum of two mixes per estate and two observations per mix. The full results and analysis of variance have now been submitted to the R.R.I.C. by the London Advisory Committee, and a summary of the finalised distribution of the estates within the classes is given below :—

	MODULUS				MOONEY		
Class Mark	Limits	As measured at 20°C No. of Estates	Calculated from Strain at 20°C No. of Estates	Corrected to 30°C No. of Estates	Class Mark	Limits	No. of Estates
Blue	>50	28	19	24	Cross	>87	5
Yellow	40±10	4	13	8	Circle	80±7	27
Red	<30	—	—	—	Line	<73	—
Total	—	32	32	32	—	—	32

Considering only the third method of modulus determination, as the temperature (30°C) and method (Strain test) used approached most nearly the procedure that will eventually be followed by the R.R.I.C., the following table has been drawn up showing the distribution of estates (% in brackets) between the classes.

MODULUS	MOONEY			Totals
	Cross	Circle	Line	
Blue	4 (12.5)	20 (62.5)	0	(75.0)
Yellow	1 (3 .1)	7 (21.9)	0	(25.0)
Red	0	0	0	0
Totals	(15·6)	(84.4)	0	(100)

Since the samples have been drawn near the end of the last quarter of 1950 or in the early part of the first quarter of 1951, it is interesting to compare the distribution with that reported for T.C. rubber (bales?) from Indochina and from Malaya for the first quarter of 1951. Originally, the organisers of the classification system intended to fit the class limits for modulus so that the bulk fell in the yellow class with some in the red and in the blue ; but for the first quarter of 1951 the bulk of the Indochina rubber fell in the blue class like the Ceylon T.C.B.1 sheets (above). Neither Indochina nor Malaya reported much 'red' rubber.

Any tendency to conclude that this experiment gives a fair sample of Ceylon's RSS has, unfortunately, to be accepted with considerable reserve since (1) no smallholding's sheet has been included and (2) the numerical value of the day to day variations in technical properties at the estates is not known. The interval between sampling and testing is well beyond that normally found in producing areas.

4. **Experiment T.C.B.2 (6 days x 6 estates).**—Experiment T.C.B.1 had been designed principally to furnish some information on the distribution of Ceylon RSS amongst the nine classes and the validity of the data for this purpose has been mentioned in the previous paragraph. Rather than repeat this experiment on another day, the decision has been taken that more useful information could be obtained for about the same volume of work by the London Advisory Committee by a different design. The suggestion of 6 Estates x 6 Days x 2 Bundles x 2 Mixes (144 test mixes) has been agreed with the London Advisory Committee, and the decision on whether to do two cures per mix or not being left to London.

The days of sampling have been selected in two groups of three with an interval of at least five weeks between the two groups of days. The intention to divide the estates into two estates in each of three average altitude groups, such that there are two estates (one with an area of rubber over 800 acres whose latex is completely processed at one factory and the other with the corresponding area under 500 acres) to the high altitude level (average altitude 1000' or more, less than 20% in the range 300-600', none under 250'), to the medium altitude level (all in the range 300-600') and to the low altitude level (average under 251', all below 300') had to be slightly modified and Dartonfield has been included as one of the estates. In all cases the estates have been asked to make a randomised selection of eight sheets per day and an officer of the R.R.I.C. supervised and explained the labelling and method of selection to be employed at the estate (usually by the resident rubber maker) on at least two of the six

days. The sheets have been subsampled at the R.R.I.C. by randomised selection of approximately equal weights of each sheet (about a quarter) and making four such portions into a bundle. For testing the London Advisory Committee have been asked to make two mixes per bundle preferably after homogenisation within the individual bundles. This procedure with two cures per mix gives a total of forty eight observations per estate allowing a comparatively detailed analysis of variance for each estate.

5. **Packing House Experiments.**—Subject to experimental verifications, it may be possible to classify Ceylon estates RSS either on the estate, or in the packing house as part of the normal output of the Packer. In the case of smallholding's RSS only the latter course appears economically practicable at present. The application of classification at the packing house is unfortunately liable to be attended by certain technical difficulties. Thus, through the unavoidable sampling and testing errors, the value of the physical property being measured may fall into the zone of uncertainty between two classes; further, if a consumer asks for a particular class of rubber rather than for just classified rubber it is by no means certain that this can be met at the packing house as the blending process will tend to throw the bales into a limited number of classes. It is anticipated from experience elsewhere that these objections can be overcome if estates supply previously classified rubber to the market and if some measure of control of the properties can be arranged on the estates. The idea of making the numerical value of the property on the bale is at present foreign to this system of classification.

In a circularised letter explaining the above points to Packers, the suggestion that an attempt be made to obtain information on the degree of blending achieved during normal packing has been taken up by one packer. The final design of the experiment arranged between the packer, the London Advisory Committee and the R.R.I.C. is 3 days x 3 grades x 3 bales (+ 1 day x 3 grades x 2 bales) x 2 mixes x 2 cures. Various other packers have supplied the R.R.I.C. with data on their output and procedures and a number of them have been visited by the Chemist. Eventually it is hoped to persuade one of these to permit the R.R.I.C. to undertake a similar experiment at their premises.

(b) **Miscellaneous.**

1. **Peradeniya Hard Rubber Trees.**—The testing of the rubber from certain 'hard' rubber trees in Peradeniya Gardens has been commenced by suitable arrangements between the Director of Agriculture, the School of Agriculture, the London Advisory Committee and Dr. Phillis. The history of the trees, according to the correspondence, is as follows: In 1913 seed was collected from an acre of hard Para rubber on the lower reaches of the Amazon and sent to Java. In 1922 seed from the Java trees was sent to Ceylon and planted at Peradeniya, three seedlings were raised one of which is now dead. In 1924 further seed from the only high yielding Java trees was planted in Ceylon and ten seedlings (A 1-10) were raised. The trees have been tapped at intervals, and towards the later part of 1950 the biscuits from fourteen tappings (S/2, d/3) have been stored under water until the final tapping when all have been buked, creped and sent to London for tests for unusual characteristics etc.

Of the eleven samples tested for Mooney (ML.4 100°C) viscosity, seven appear to have Mooney values above 94 three of the remainder are above 79 and only one appears to be below 73. (The limits of the centre Mooney class for technical classification are 80 ± 7). On the basis of the Mooney values and D 10 plasticity tests many of the samples have been provisionally

classified as hard and one as extremely hard, although the length of resting period (if any) before tapping is not known. Tests on the rubber compounded in the M.P.C. tread mix showed a high resilience in conjunction with a low modulus for one sample and arrangements to resample the trees during 1951 have been made principally to ascertain whether this combination of high resilience and low modulus can be confirmed. In the 1951 tappings the coagulum has been rolled and smoked, not stored under water. The yield of these trees per inch of cut has been the subject of correspondence between the School of Agriculture and the Botanist, it is understood that the figure is below 2 gms/inch in all cases.

2. **Scorch et al.**—The selection of the A.C.S.1 mix as the standard for technical classification has meant that various laboratories have spent considerable time attempting to relate modulus and strain with various other properties. Since the usefulness of the modulus classification depends at least in part of these relations some of the correlation coefficients obtained by the London Advisory Committee on the samples of T.C.B.1 (29 estates x 1 day) are reproduced below for the 29 estate pairs of test data.

Modulus and	Resilience	...	0.64
,, ,,	Strain	...	−0.97
,, ,,	Scorch Time	...	−0.91
,, ,,	Compound Mooney	...	0.20
,, ,,	Raw Mooney	...	0.47
,, ,,	Hardness	...	0.96
	Compound Mooney and Scorch		0.026
	Strain and Scorch	...	0.90
Strain and	Hardness	...	−0.95

Research Laboratories,
Dartonfield,
Agalawatta.
24th January, 1952.

REPORT OF THE BOTANIST FOR THE YEAR 1951

By

C. A. De Silva.

The major part of the work of this department consists of the studies of clones and clonal seedling material both foreign and local. In 1951, growth and yield results were recorded from 25 experiments in the three sub-stations of the Institute. A new small scale experiment was initiated in July 1951, to test aluminium collar rainguards on budded rubber for increasing the annual crop. As in former years the yields whenever possible, are presented in pounds of dry rubber per tree per tapping year of 140 tappings, based on experimental tapping carried out on normal tapping days once or twice in each month. These figures can be used for making reliable comparisons between tested clones and controls. Any attempt to use these figures directly for predicting yields, which can be obtained from large scale commercial planting in any particular district will be misleading. A final choice of tested clones can only be made by a study of the performance of these clones in small scale trials on estates in the various rubber planting districts of Ceylon. Budwood of promising clones selected on the comparative results of our experiments presented in this report have, therefore, been distributed to estates in various districts throughout the year.

Rainguard Experiment, 1934 Replanted Area, 7½ acres, Dartonfield.

The three clones GL.1, AV.256 and PB.25 in this area have been divided into 2 equal sections one with rainguards and the other as a control. Preliminary yields of the two sections were made before fixing rainguards to assess the initial yielding capacity of the areas on trial. The rainguards were fixed in July and experimental tapping commenced in July. The preliminary results are summarised under and show an increased yield of 8.3% for the 6 months tapping. The dry months ahead in the tapping year will even out the yields somewhat. Further comments will be premature until the completion of the tapping year. It is unlikely, however, that the whole of the crop lost during wet weather can be saved with the use of rainguards and in most cases an increase in the number of tapping days will be followed by a decrease in the average yield per tapping. In the wet districts it is often possible to tap the guarded trees on dry cuts in the morning while only a late tapping is possible on trees without rainguards, where the tapping cuts are wet. Increased yields on early tappings are obtained under these conditions.

1951 Rainguard Experiment, 1934 Replanted Area, Dartonfield.

No. of Trees	Rainguards 376	Controls 376
Preliminary yields in lbs. dry rubber March to June, 1951	896.6	804.9
Experimental yield, lbs. dry rubber July to December, 1951	2155.6	1902.3
Approximately adjusted yields for initial yield differences	2109.6	1948.3
Excess yields	161.3	
As per cent control	8.3	

Analysis of tapping days — July to December 1951.

	No. of days
Normal tapping	132
†Late tapping due to wet cuts	27
Interference by rain (washouts)* ...	5
No tapping due to rain	15
	179

* Latex collected from "guarded" tapping cuts

† Early tapping possible on "guarded" trees on dry cuts.

1936 Replanting Experiment, Dartonfield.

A part of this experiment designed to assess the growth and yield of trees planted as stumped buddings, budded stumps and field buddings has been continued up to the present time. Table I gives the yield and girth figures from 1942 onwards, when the trees were first taken into experimental tapping. It is not often realised that the stumping of a two year old budgraft in the nursery and transplanting give a marked set-back to the plant. The 1938 girth measurements show that in two years the four to five inch girth stumped budgrafts have put on 3½ inches girth while the budded stumps in the same time have put on about 6 inches from the

bud-patch stage. About 1945, both growth and yield of stumped budgrafts and budded buddings have practically evened out. The gain in crop during the first three years of tapping will hardly compensate for the high initial costs of planting stumped budgrafts. This form of planting material is, however, very useful as late supplies in two year old plantations. The field buddings are still somewhat behind in growth and yield as the field buddings were carried out about one and a half years after the planting of stumped buddings, budded stumps, and stock seedlings in the field in the same year. This experiment will be discontinued from 1952.

TABLE I

1936 Replanting Experiment

One sample tapping per month on S/2, d/2, 100%

Age	Stumped budgrafts		Budded stumps		Field buddings	
	Yield in grams per tree per tapping	Girth in inches	Yield in grams per tree per tapping	Girth in inches	Yield in grams per tree per tapping	Girth in inches
June, 1938	—	8.55	—	6.21	—	—
,, 1939	—	11.84	—	9.19	—	4.89
,, 1940	—	15.33	—	12.77	—	7.91
,, 1941	—	19.04	—	16.56	—	11.65
,, 1942	10.0(92)	21.80	*9.5(90)	19.74	—	15.29
,, 1943	14.3(91)	23.33	11.8(92)	21.93	*9.8(77)	17.87
,, 1944	17.9(92)	25.26	14.3(94)	23.72	12.2(77)	20.39
,, 1945	18.7	26.53	17.0	25.39	11.3	22.22
,, 1946	23.0	28.29	21.2	27.33	16.0	24.21
,, 1947	24.5	29.74	23.2	29.22	17.5	26.13
,, 1948	29.0	30.68	27.5	30.16	21.9	27.12
,, 1949	30.7	31.11	29.1	31.40	22.5	27.68
,, 1950	21.8	31.38	24.4	31.39	20.2	27.89
,, 1951	26.3	32.05	26.1	31.89	21.1	28.35

* Tapped in December of the year only.

Figures in brackets indicate the number of trees tapped in the first 3 years of tapping. Experimental tapping commenced on trees of 18 inches and over.

1939 Replanted Area, Dartonfield (2 Acres).

Among other clones, selected Prang Besar "fraction" clones were planted in this area on a limited scale. The test-tapping results based on one sample tapping per month are summarised for 7 years in Table II.

TABLE II

Clone	Tapping Commenced	No. of trees tapped 1951	Yield in lbs. per year on 140 tappings						
			1945	1946	1947	1948	1949	1950	1951
PB 6/9	Mar. '44	39—45	6.5	6.4	8.0	7.8	13.1	9.3	8.6
P/B 5/60	Sep. '44	24—28	5.8	6.3	8.9	10.8	11.6	10.4	9.3
P/B 5/139	Mar. '45	31—30	4.1	4.4	6.3	6.1	8.7	7.2	6.9
P/B 6/50	Sep. '48	10					9.1	6.8	7.9

The highest yields were obtained in 1949, incidentally a year for mild Oidium leaf disease. There has been a deterioration in yields in 1950 and 1951, both bad years for the leaf disease. PB6/9 is the best yielder but is highly susceptible to Oidium and helps to keep the disease active for a considerable period in this particular area. Although many estates planted these clones on a small scale, we have had little information of their performance. In general this series of "fraction" Prang Besar clones imported about 1938 have failed to come up to the standard of clones recommended for commercial planting at the present time.

Replanting Experiment, 1941 Dartonfield (6½ acres).

This experiment which was designed for investigations on stock-scion effects was continued in 1951 to assess the yields of RRIM. clones which make up the five monoclonal blocks of the original experiment. The yields are summarised under :—

Yield of RRIM. '500' series clones, 1951

One sample tapping per month tapped S/2, d/2, 100%

Clones	RRIM. 500	RRIM. 501	RRIM. 506	RRIM. 520	RRIM. 514
No. of trees tapped	93—85	89—78	75—74	90—89	86
Yield in lbs. per tree per year (140 tappings)	10.2	17.2	10.3	9.7	6.5
No. of trees with Brown Bast, 1951	14	28	52	20	

The yields of clone RRIM.501 are outstanding in spite of the somewhat severe attack of Oidium leaf disease on these trees in 1951. The trees were first tapped in March, 1948. RRIM.500 has given promising yields in the 1940 clone trial at Nivitigalakele; these results are presented in Table V. The incidence of Brown Bast is on the high side for clone RRIM.501, and 506. The latter also shows an undesirable late dripping habit.

Clonal Seedling Trial, 1947 Replanted Area, Dartonfield.

The following material is on trial in this area originally planted with plots of forty nine trees replicated eight times :—

1. TJ.1 (selfed seed)
2. PB.86 illegitimate seed
3. PB.5/139 illegitimate seed
4. H.P. seedling collection from 1945 crosses, representing a hypothetical isolated seed garden with clone parents of TJ.1, BR.2, AV.163 and AV.255.
5. TJ.1 budgrafts (control).

The Morris-Mann system of early tapping of four year old trees was carried out during the second quarter of 1951, and the stand of 260 trees was thinned out to approximately 160 trees per acre on a plot basis on these yield results. The control budded trees, which were also planted at 260 trees to the acre were thinned out to 160 per acre on growth measurements only, as the girth and yield of budded trees are highly correlated. The mean girth figures of the total stand of seedling trees in February 1951

and the selected trees after thinning out in July, 1951 are given in Table III. together with the yield of 5 tappings on the Morris-Mann system. The yield of the seedlings at maturity will give an indication of the usefulness of this system for early selection.

TABLE III

Planting Material	TJ. 1 Selfed seedlings	PB. 86 illeg. seedlings	PB5/139 illeg. seedlings	H. P. seedling collection	Control TJ. 1 budded
Girth in inches prior to test-tapping Feb. '51	14.8	13.8	14.7	13.6	10.9
Yield in grams per tree for 5 tappings	24.1	18.2	30.4	29.8	Not tapped
Girth in inches, July 1951, after thinning	17.5	16.4	17.5	16.3	14.0

1939 Clearing, Field 6A, 10¼ Acres, Nivitigalakele.

Thirty seven new local clones and seven control clones were originally on trial in this area. Test-tapping has been continued on eight selected clones and controls. The results are summarised over a period of seven years in Table IV.

TABLE IV

1939 Clearing, Field 6A, Nivitigalakele

Tapping system S/2, d/2, 100%, 2 sample tappings per month

Clone	No. of trees tapped 1951	Yield in lbs. of dry rubber per tree per year, 140 tappings							Total Brown Bast cases 1951
		1945/6	1946/7	1947/8	1948*	1949	1950	1951	
NAB. 3	20	2.9	4.1	6.0	10.1	12.1	11.4	11.0	3
,, 8	19—18	2.9	4.5	7.9	9.1	11.0	11.0	11.2	7
,, 11	20—18	2.7	4.8	7.2	10.0	10.8	10.9	10.8	3
,, 12	19—18	3.0	5.0	8.5	12.4	13.3	15.1	15.4	2
,, 15	19—18	4.4	6.8	11.6	12.8	15.9	15.0	14.7	2
,, 16	20—19	5.1	6.6	9.4	9.5	10.8	9.1	8.4	1
,, 17	20—17	5.1	7.9	12.2	13.6	15.2	14.9	14.2	9
,, 20	18—17	3.4	6.3	10.2	16.6	15.5	16.7	14.6	4
Controls									
MK. 3/2	18	2.1	4.0	5.7	7.5	9.9	10.4	11.2	4
WG. 6278	19	3.4	4.6	6.9	6.9	7.9	8.0	8.1	2
GL. 1	20	4.0	4.8	7.0	8.1	9.2	10.4	8.7	2
PB. 86	20	3.9	6.1	8.4	9.8	13.2	13.0	15.3	1
TJ. 1	19—18	2.6	4.7	5.9	9.6	11.3	12.0	10.9	3

* 10 months tapping

Compared with the control clone PR.86 the yields of the NAB. clones in 1951 have shown no improvement over those of 1950. This is presumably due to the heavy incidence of Oidium heveae early in 1951. Clone

PB.86 is generally less susceptible to the disease than most clones. Clones NAB.12, 15 and 20 will be planted on a commercial scale at Dartonfield in 1952 with clones RRIM.501, PB.86 and PR.107 as controls.

1940 Clone Trial, Field 6B, 9¼ Acres, Nivitigalakele.

Foreign clones reputed for high yields in their countries of origin are tested under local conditions in this experiment. Four tree plots replicated six times give a total of 24 trees of each clone. The trees were first tapped in January, 1947. The yields of the most promising clones are summarised in Table V up to 1951.

TABLE V.

1940 Clone Trial, Field 6B, Nivitigalakele

Tapping system S/2, d/2, 100%. 2 sample tapping per month.

Clone	No. of trees tapped 1951	Yield in lbs. per tree per year 140 tappings					Brown Bast Cases 1951
		1947/48	1948*	1949	1950	1951	
AV.255	24—15	5.6	8.7	9.9	13.3	12.3	8
PB6/50	23—21	5.9	7.6	8.9	11.1	9.5	5
RRIM501	22—19	5.4	8.8	11.7	10.8	13.0	4
RRIM513	24	5.8	9.9	11.2	10.5	9.2	1
PR107	12—23	4.7	7.9	10.1	10.1	10.5	2
RRIM500	21—18	5.6	6.7	7.1	10.0	6.4	7
B.1	23	3.9	6.6	8.0	9.8	10.5	1
LUN.N	21—20	3.8	7.5	8.2	9.7	8.9	3
WAR.4	23	4.2	6.6	7.3	9.7	8.7	1
NAB.26	24—23	6.4	7.8	8.8	9.5	7.7	2
PR.105	22—21	4.2	6.9	8.4	9.2	8.9	3
AV.352	22—17	2.6	5.6	7.7	9.2	9.5	4
RRIM519	21—20	4.5	6.5	7.1	8.0	7.9	5
RRIM506	7—5	5.1	7.2	6.6	7.0	5.5	17
RRIM504	24	5.1	7.5	8.0	6.9	7.4	—
RRIM511	22	5.9	6.4	7.3	6.9	6.5	3
RRIM514	24—23	4.9	5.8	7.1	6.6	5.4	3
Controls							
TJ.1	23—21	3.8	6.6	8.1	10.8	10.8	5
WG6278	23—22	3.9	6.1	6.5	9.4	8.1	2

* Ten months tapping only.

In general the yields for 1951 are of a lower order than those in 1950, this again is presumably due to the heavy incidence of Oidium in 1951. Clone RRIM.501 has again given outstanding yields, although it is not free from heavy attacks by Oidium, as shown at Dartonfield. Clone AV255 again shows high yielding capacity. A block of 5 acres of this clone will be planted in Hedigalla in 1952 in connection with a new manurial trial. Brown Bast cases in this clearing for this clone are somewhat on the high side. Clone PR.107 keeps up its reputation for good yields.

It will be included in a large scale commercial trial at Dartonfield in 1952. Both these clones have been recommended for small scale trials on estates since 1944 in our Advisory Circular No. 20. Estates should now be in a position to check up the early yield of these clones. Incidentally clones, AV 255 and PR 107 are recommended for large scale planting in Indonesia for 1951-52.

A local clone B.1 which was overlooked in former years has shown a steady increase from year to year and in, 1951 is quite promising. The budwood of this clone will be multiplied for trial on a larger scale.

1941 Clearing, Field 6C, 7 Acres, Nivitigalakele.

Seedlings established from the 1939 hand pollination programme are planted in this clearing. Five tree clones from a proportion of these seedlings based on pricking tests with the "Testatex" knife were planted in an adjacent area. Tables VIA and VIB give the yield results of the clonal seedling families and selected five tree clones, which have given promising yields up to the fifth year of tapping. Six more clones are included in the selected list in, 1951. Six of the selected clones which have been planted out in a clone trial in 1950 are indicated in Table VIB. Budwood of the best of the remaining selected clones will be multiplied in nurseries for trials on a larger scale.

It will be noted that the clonal seedling families with our local clones WG.6278, MK.3/2 and BS.3 as parents have given indications of promising yields for this type of planting material.

The high yielding qualities of both seedlings and clones in this clearing apart from the selected clones, are confirmed by the general commercial yields on the Nivitigalakele Estate which show a yield of 993 lbs. dry rubber per acre per year for 1951.

TABLE VIA.

1941 Clearing, Field 6C, Nivitigalakele
Tapping system S/2,d/2, 100%, 2 sample tappings per month

Family	No. of trees tapped 1951	Yield in lbs. per tree per year 140 tappings					Brown Bast Cases 1951
		1947/8	1948*	1949	1950	1951	
BS3 × MK3/2	49	3.3	6.0	8.2	9.4	11.5	3
MK3/2 × WG6278	3	2.6	6.9	8.0	13.2	12.6	1
BS3 × PIL.A.44	37—35	3.2	4.6	6.5	7.7	8.3	—
PIL.A.44 × WG6278	18	2.6	5.1	5.6	7.4	8.7	1
BS.3 × WG6278	44	3.6	7.7	10.0	13.6	15.6	1
PIL.A.44 × BS.3	15	2.6	3.8	5.2	6.2	6.3	1
PIL.A.44 × MK3/2	5	3.2	5.9	7.5	8.3	8.4	1
WG6278 × MK3/2	3	3.8	8.1	9.2	11.9	10.0	1
BS3 × TJ.1	3	2.7	4.7	6.7	9.9	11.8	—

TABLE VIB.

1941 Clearing, Field 6C, Nivitigalakele

S/2,d/2, 100%, 2 Sample Tappings per month.

Clone	Mother tree Number and Seedling family	Yield in lbs. per tree per year 140 tappings					Brown Bast Cases 1951
		1947.8	1948	1949	1950	1951	
* RR134	50, M.K.3/2 × WG.6278	3.5	6.6	11.2	15.8	11.6	—
* RR108	116, BS.3 × MK.3/2	6.3	11.2	13.5	14.5	13.3	2
* RR116	28, BS.3 × MK.3/2	4.7	8.3	12.5	13.7	13.8	—
* RR163	110, PIL.A.44 × WG.6278	4.4	8.0	9.2	12.1	10.4	—
* RR181	147, BS.3 × WG.6278	4.5	8.6	10.8	11.8	13.7	—
RR125	40, BS.3 × MK.3/2	3.7	6.2	11.5	11.3	11.5	1
* RR119	31, BS.3 × MK.3/2	3.4	7.2	9.6	11.4	11.5	—
RR173	129, BS.3 × WG.6278	4.1	6.4	9.6	11.1	10.6	—
RR121	36, BS.3 × MK.3/2	5.3	6.8	10.8	10.3	11.3	—
RR146	77, MK.3/2 × PIL.A.44	5.0	6.2	9.3	10.0	10.3	—
RR153	91, PIL.A.44 × WG.6278	5.9	10.0	10.8	10.7	13.3	1
RR111	21, BS.3 × MK.3/2	5.6	8.3	9.6	10.1	11.7	2
* RR195	183, WG.6278 × MK.3/2	5.5	7.9	14.0	9.7	8.2	—
RR126	41, BS.3 × MK.3/2	4.9	8.4	11.6	9.7	11.6	2
RR120	34, BS.3 × MK.3/2	3.0	6.2	9.5	9.5	12.1	—
RR131	47, BS.3 × MK.3/2	3.5	5.6	8.6	9.5	11.6	1
RR196	164, WG.6278 × MK.3/2	—	6.3	10.3	8.9	8.4	—
RR123	38, BS.3 × MK.3/2	4.2	6.6	8.5	9.7	13.9	—
RR128	43, BS.3 × MK.3/2	4.2	6.8	8.9	10.2	13.4	—
RR129	44, BS.3 × MK.3/2	3.5	5.6	9.0	10.8	12.4	—
RR168	118, BS.3 × WG.6278	2.8	6.3	8.8	9.1	12.4	—
RR169	120, BS.3 × WG.6279	3.7	6.2	8.5	8.9	11.6	—
RR197	185, BS.3 × TJ.1	3.9	8.0	9.4	8.5	11.7	—
RR198	186, BS.3 × TJ.1	4.5	5.8	9.1	9.1	11.0	—

* Include 1950 clone trial.

1942 Clearing, Field No. 7, 5 Acres, Nivitigalakele.

Clonal seedlings of the 1940 hand pollination programme were planted in this area together with a few illegitimate seedlings of clone AV.185. The trees were first brought into tapping in January, 1949. The yield results are summarised in Table VII. Results of boundary trees outside the experimental layout are given at the end of the table for 1951 only.

TABLE VII.

1942 Clearing, Field No. 7, Nivitigalakele

Tapping S/2, d/2, 100%, 2 sample tappings per month.

	Family	No. of trees tapped 1951	Yield in lbs. per tree per year 140 tappings			Brown Bast Cases
			1949	1950	1951	
1.	BS.3 × HC.28	71—68	3.0	4.8	6.9	1
2.	BS.3 × TJ.1	70—65	4.0	6.8	9.4	9
3.	MK.1/3 × BS.3	6	2.1	5.5	9.7	—
4.	MK 1/3 × MK.3/2	6	2.2	4.6	7.2	—
5.	HC.28 × WG.6278	2	3.3	6.4	11.1	—
6.	MK.1/3 × WG.6278	7	2.0	4.3	7.7	—
7.	AV.185 ill. seedlings	20—19	3.0	4.6	7.5	—
	WG.6278, budded control	67—64	4.5	5.9	8.4	3
	Boundary trees					
	BS.3 × H.C.28	63—61	—	—	6.3	2
	BS.3 × TJ.1	30—27	—	—	8.4	2
	WG.6278 × budded	58—56	—	—	7.9	2

The increased yields for 1951 are very satisfactory. The two clonal seedling families with over 70 trees each give further indications of the usefulness of local clones BS.3. and HC.28 as seed parents.

1944, Small Scale Clone Trial, Field 8, 4½ Acres. Nivitigalakele.

This area was cleared from jungle and planted with food crops in 1942. In 1944, ninety clones derived from hand pollinated clonal seedlings in the 1942 clearing were planted out with 3 tree clones. Clone WG.6278 was used as a control for groups of 6 clones. Owing to the presence of large sections of rocky outcrops, this area of 4½ acres is sparsely planted with only 364 trees. The trees were first tapped in March 1951, and the results of the most promising clones in the first year tapping are given in Table VIII. These represent 16 clones yielding over 20 grams. per tree per tapping.

TABLE VIII.

1944 Small Scale Clone Trial, Field 8, 4½ Acres (Nivitigalakele)
2 sample tappings per month on S/2, d/2, 100%
Yield in lb. per tree per year of 140 tappings.

Clone	Mother tree No. and seedling family	Yield	Clone	Mother tree No. and seedling family	Yield
2/101	101, BS3 × TJ.1	6.4	2/81	81, BS3 × TJ.1	8.0
WG6278		5.9	WG6278		4.6
2/105	105, BS3 × TJ.1	6.9	2/41	41, BS3 × TJ.1	8.8
WG6278		4.3	WG6278		4.6
1/115	115, BS3 × HC28	9.7	2/14	14, BS3 × TJ.1	7.3
WG6278		4.3	WG6278		4.6
1/44	44, BS3 × HC28	6.7	2/18	18, BS3 × TJ/1	8.0
WG6278		4.3	WG6278		5.1
7/1	1, Ill. seedling AV185	6.5	2/33	33, BS3 × TJ.1	6.5
WG6278		4.3	WG6278		5.1
1/3	3, BS3 × HC28	6.4	2/35	35, BS3 × TJ.1	6.8
WG6278		4.3	WG6278		3.9
1/101	101, BS3 × HC28	7.1	1/121	121 BS3 × HC28	6.3
WG6278		4.6	WG6278		3.9
1/37	37, BS3 × HC28	6.6	2/96	96, BS3 × TJ.1	7.4
WG6278		4.6	WG6278		5.1

In the first year of tapping some clones in the above table show outstanding yields compared with the control clone WG6278. Budwood of the best of these will be multiplied for trials on a larger scale, while the test-tapping is continued for a few more years.

Large Scale Clone Trial, 1946 Replanted Area, 21 Acres, Nivitigalakele.

The planting of this clone trial was completed in October, 1946. Clones LCB.1320 and CHM3 owing to poor budding results were supplied throughout the year 1947. Girth measurements taken in January 1951, are summarised under, with those of the previous year :—

Large Scale Clone Trial, 1946 Replanted Area, Nivitigalakele
Mean Girth in Inches

Clones	AV255	AV352	PB6/9	PB5/60	LCB 1320	CHM.3	TJ.1	PR107
1951	12.80	11.51	14.09	11.59	11.79	11.58	10.82	9.53
1950	8.80	7.73	9.08	8.32	7.71	7.36	6.86	6.29
Increase 1950/51	4.00	3.78	5.01	3.27	4.08	4.22	3.96	3.24

This area was rather backward in growth in 1948 and 1949. Special attention was given to backward trees in 1950 by cultivation and manuring. The increase in girth in 1950/51 is very satisfactory. This area will come into tapping about the end of 1952. Clone LCB.1320 is of particular interest in this replanted area.

1946 Replanted Area, A and B budgrafts of clone MK 3/2.

The A and B series represent budgrafts taken from the highest and lowest yielding trees of clone MK3/2 respectively of the forty four original buddings in the Nivitigalakele 1928 clearing. The average girth of sixty budgrafts in each series planted in alternate holes as single tree plots, is given under for January, 1952.

Mean Girth in Inches

A, series	...	...	14.8
B, series	...	...	14.4

The average growth of the two series is approximately equivalent. This condition is favourable for assessing any differences in yield due to bud variation in the future.

Trial of legitimate seedlings and derived clones 1943/44 clearings, Hedigalla.

Legitimate seedlings from 1941 hand pollinations and five tree derived clones, with clone WG.6278 as a control are planted in this area. A proportion of the seedlings was planted in a randomised block experiment, and the surplus trees of each seedling family were planted as boundary trees. Tapping commenced in September 1950, but owing to shortage of staff and equipment at the Hedigalla station, test-tapping did not start till May, 1951. Yield results of the better represented seedling families and selected clones from May to October 1951 are summarised in tables 9A and 9B. 280 clones were test-tapped and a preliminary selection of 67 clones have been made for further test-tapping with an average yield of 24.2 grams per tree per tapping.

TABLE IXA.

Legitimate Seedlings, 1943/44 clearing Hedigalla
2 sample tappings per month on S/2, d/2, 100%
from May to October. 1951.
(Yield in grams dry rubber)

Seedling family	No. of trees tapped	Yield per tree per tapping	Seedling family	No. of trees tapped	Yield per tree per tapping
1. MK.1/3 × TJ.1	23	19.2	20, DK5315 × RH10	11	15.5
2. MK.1/3 × HC.28	11	14.2	22, TKD113 × BS3	12	28.0
7. BS.3 × DBK.1	54	21.3	26, TJ.1 × PB.86	26	22.6
8. BS.3 × H.24	23	20.3	27, PB.86 × TJ.1		
9. BS.3 × TJ.16	14	16.6	28, M65 × PIL.B.84	29	19.1
			29, PIL.B.84 × M.65		
10. BS.3 × RH.10	10	21.3	30, PB.86 × PR107	25	37.0
13. RH 10 × MK.3/2	28	16.6	31, PB.86 × M.162	14	25.1
17. RH.10 × TJ.16	13	18.5	38, RR.9 × BS.3	12	19.5
19. DBK.1 × MK 3/2	15	21.0	Budded WG.6278	20	19.1

The local clones DBK.1, RH.10, DK.5315, M.65, RR.9 and M.162 appear for the first time as clone parents. These early yields of rather limited number of trees in each family indicate their potentialities and seed parents.

TABLE IXB.

Five Tree Clones, 1943/44 clearings, Hedigalla.
2 sample tappings per month on S/2, d/2, 100%
from May to October, 1951.
(Yield in grams dry rubber)

Clone	Mother tree seedling family	Yield per tree per tapping	Clone	Mother tree seedling family	Yield per tree per tapping
8/1	BS3 × H24	35.4	30/9	PB86 × PR107	25.1
12/1	BS3 × DK5315	27.1	31/9	PB86 × M162	30.4
28/1	M65 × PIL.B.84	25.7	7/16	BS3 × DBK.1	31.6
14/2	RH10 × TJ.1	26.9	7/17	BS3 × DBK.1	27.8
11/3	BS3 × PB86	31.6	30/18	PB86 × PR107	28.6
12/8	BS3 × DK5315	35.9	30/23	PB86 × PR107	32.6
7/10	BS3 × DBK.1	28.9	30/26	PB86 × PR107	26.4
26/14	TJ.1 × PB86	26.8	26/10	TJ.1 × PB86	28.4
30/7	PB86 × PR107	28.2	7/36	BS3 × DBK.1	26.0
22/9	TKD113 × BS3	25.4	7/42	BS3 × DBK.1	28.3
20/10	PB86 × TJ.1	33.8	9/11	BS3 × TJ.16	32.9
9/1	BS3 × TJ.16	26.6	Control	WG6278 budded	17.6
30/10	PB86 × PR107	33.5			

The above clones are the best of 280 clones in test-tapping from May to October. The yields are outstanding for the first tapping year. It should be noted however that the period of tapping is the better yielding half of the tapping year, which commenced in September 1950.

1944 Small Scale Clone Trial, Hedigalla.

Sixteen clones are tested in this experiment, replicated five times in single tree plots. Tapping commenced in August 1952 and the yield results for the third quarter of the year are summarised in Table X. The Prang Besar fraction clones PB5/122 and PB6/5 show promising yields compared with the control clone WG6278. It would be premature, however, to comment further on these early results of three months duration.

TABLE X.

1944 Small Scale Clone trial, Hedigalla
2 sample tappings per month on S/2, d/2, 100%
from August to October, 1952.

Clone	Yield per tree per tapping in grams	Clone	Yield per tree per tapping in grams
RR20	14.2	RR28	14.6
RR21	10.2	RR29	14.9
RR22	12.9	AD.24	9.1
RR23	15.9	DAR.1	9.5
RR24	9.8	AV.214	7.2
RR25	13.6	PB5/122	19.8
RR26	10.5	PB6/5	24.6
RR27	11.1	WG6278 (control)	17.9

1944 Stem/Branch Budding Experiment, Hedigalla.

This experiment provides for a study of variation in buds taken from different points on stem and branch budwood. 10 hand pollinated seedlings in the 1942, Nivitigalakele, Clearing were used as budwood material. H_1 and H_2 represent buds taken from two sections of the main stem, and "B" represents branch buds. Test tapping commenced in May, 1952 and the early results are summarised in Tables XIA and XIB. Each clone is represented by fifteen trees according to the layout of 5 replications of the three types of budgrafts within each clone.

TABLE XIA.

Clone Yields in Grams per Tree per Tapping
2 sample tappings per month or S/2, d/2, 100%
from May to October, 1951.

Clones	1/130	1/5A	2/72	1/3A	2/32	1/1A	2/23	2/63	1/4A	2/108
Yields	10.4	17.9	13.6	9.3	18.8	13.0	21/9	19.0	9.3	21.3

TABLE XIB.

Budwood type			Yield in grams per tree per tapping
H_1	...	...	15.0
H_2	...	...	16.1
B	...	...	16.2

The early indications are that there is little difference in yield between the budgrafts from the three types of buds from each clone.

Crown Budding Experiment, 1945.

This experiment provides for a study of the effect of crown-budding on budded centre sections, which in practice will be high yielding. Each plot consists of 36 trees made up of six tree rows of six clones which make up the centre sections. These clones represent high and low yielding types. Each plot of 36 trees is crown-budded with a single clone represented in the centre sections. The experiment has all combinations of high and low yielding crowns and centre sections, with a control of a centre section with its own crown. A splitting of the six tree rows into three buddings at a height of 8 feet and three at 5 feet from ground level gives 108 comparisons of three effects at the two heights of budding.

Girth measurements were taken in September, 1950 just after crown budding and in December 1951. Growth increments after approximately fifteen months after crown-budding are summarised in Table XII.

Crown budding in this experiment was carried out when the budded trees were about four years of age. The early indications are that the centre sections with heavy crowns like clone TJ.1, PB86, and AV.256 have grown better than those with sparse foliage like clones PM.17 and GL.1. This is to be expected. LCB.870, the Oidium immune clone has a heavy crown but is a poor yielder.

The girth figures, fifteen months after crown-budding, show no differences in girth for crown-budding at a height of eight feet and five feet. The average figures are as follows :—

	Mean Girth in inches
Crown budded at 8 feet ...	11.3
„ „ 5 „ ...	11.1

The trees in this experiment according to age have lost four to five inches of girth due to late crown-buddings. These early growth figures have not been statistically analysed and are broadly indicative of crown-budding effects on four year old budded trees. The set-back is much less marked on trees crown-budded after eighteen to twenty four months growth.

TABLE XII

Girth Increments in Inches 1950/51

Centre section	CROWN						Mean increase
	TJ.1	AV.256	PM.17	PB.86	GL.1	RUB.393	
TJ.1	1.18	1.74	0.42	0.98	0.39	0.96	0.94
AV.256	1.01	1.43	0.36	0.77	1.02	0.83	0.90
PM.17	2.14	2.41	0.82	1.82	1.50	1.83	1.75
PB.86	1.14	1.11	0.30	0.80	0.59	0.57	0.75
GL.1	1.57	1.63	0.54	1.41	0.74	0.92	1.14
RUB.393	1.53	1.82	0.52	1.18	0.72	0.98	1.12
Mean Increase	1.43	1.69	0.49	1.16	0.83	1.02	1.10

Large Scale Clone Trial, 1945 Clearing.

6 PBS clones established from selected Prang Besar Seedlings are tested against clone TJ.1 in this area. The Prang Besar seedlings were planted in 1935 at Nivitigalakele, and the 6 clones were final sections from 3 point buddings of these seedlings test-tapped for 4 years at Nivitigalakele. Girth measurements were taken in January 1951, and the results are summarised under :—

Large Scale Clone Trial, Hedigalla Girth Measurements in Inches.

Clones	PBS.66	PBS.69	PBS.70	PBS.90	PBS.111	PBS.181	Control TJ.1
1951	14.11	11.47	12.84	14.40	11.19	12.63	11.43
1950	11.17	9.34	10.01	11.25	8.75	10.35	8.89
Increase	2.94	2.13	2.83	3.15	2.44	2.28	2.54

These clones are growing in a particularly poor area at Hedigalla. The trees have been manured with a complete mixture since 1948. The growth in recent years has been satisfactory but the increase in 1950-51 is still below the standard expected from the wet low country districts.

1946 Clearings, 16 Acres, Hedigalla.

This area was planted with the 1943 H.P. seedlings and their five tree clones in June 1946. Girth measurements were taken in January 1951. The figures are summarised under :—

Mean Girth in Inches 5 Tree Clones (1946 clearing)

	Jan. 1950	Jan. 1951	Increase
5 tree clones ...	8.65	11.99	3.34
Clone TJ.1 control ...	7.53	10.63	3.10

Mean Girth in Inches. Clonal Seedling Families (1946 clearing)

Family	No. of plants	Girth		
		1950 Jan.	1951 Jan.	Increase
PB.86 × BS.3	64—62	11.22	14.93	3.71
PB 86 × WG.6278	19	11.47	15.07	3.60
PB.86 × TJ.1	14	11.80	15.55	3.75
PB.86 × MK.3/2	9	9.73	14.82	5.09
Budded control TJ.1	15	8.38	12.64	4.26
Extras clone TJ.1	75	8.20	11.18	2.98

The 1944 hand pollinated seedlings were planted as 2 year old stumped seedlings in August, 1947 in a clearing prepared and left over from 1946. The 5 point derived clones from the top pieces of stumped seedlings were planted in August-September, 1947 in the 1947 clearing. A total of 405 seedlings were planted of which 327 survive at the present time.

Girth measurements taken in January, 1951 are summarised in Table XII.

TABLE XII.

Clonal Seedling Families	No. of trees	Girth measurements in inches		
		March 1950	Jan. 1951	
PB.5/139 × TKD.113	130	8.64	12.55	
PB.86 × TKD.113	39	8.68	12.79	
PB.86 × GL.1	18	8.36	11.65	
PB.86 × BR.2	23	7.76	10.67	
PB.86 × MK.3/2	12	8.36	11.84	
PB.86 × DK.5315	8	7.41	10.63	
PB.86 × BD.10	8	8.33	11.91	
PB.86 × PIL.B.84	6	8.81	12.38	
PB.86 × PB.5/60	7	10 39	14.71	
PB.86 × WG.6278	5	9.55	13.20	
PB.86 × PB.5/139	6	7.17	9.96	
PB.86 × HC.28	4	8.44	12.72	
PB.86 × AV.163	4	8.34	11.19	
PB.86 × PB.6/50	4	7.59	9.78	
PB.86 × TJ.1	3	7.71	9.96	
TKD. 113 × TJ.1	25	8.35	11.21	
TKD. 113 × PBS.90	14	9.39	12.68	increase
TKD. 113 × GL.1	10	8.53	11.85	1950/51
TKD. 113 × HC.28	1	7.25	11.88	
Total	327	Mean 8.5	11.8	3.3
Derived clones	1200	,, 6.6	9.2	2.6

It will be noted that Clone PB.86 has been used as the female parent for its more reliable seed setting qualities. In recent years it has become apparent that in the seed gardens laid down in previous years the seed-set has been extremely poor, due to the fact that only a very few of the clone parents included in these gardens for good parentage set seed on any economic scale. It is necessary in the future to lay down large seed gardens with the good parents, which are prolific seed bearers, in the major proportion and include other known good parents as male parents, systematically dispersed to give maximum crosses. In the seed gardens approved on estates it is satisfactory to note that clones TJ.1 and PB.86 are planted on a large acreage. In recent years, especially in 1951, the poor seed production is no doubt due to ravages of Oidium. It is essential therefore to control this disease for high seed production.

Clonal Seedling Trial, 1947 Clearing, 60 Acres, Hedigalla.

3,565 stumped seedlings of the 1945 H.P. seedlings were planted late in 1947 in a section of this area under difficult conditions with a shortage of staff and in the absence of the Botanist on long leave. About 1,300 plants were lost following a severe drought. The vacant holes were supplied with seedings of clones TJ.1 and PB.86 from Dartonfield nurseries in sub sequent years. In 1951, more vacant holes in continuous rows totalling 500 were planted with 'selfed' TJ.1 stumped seedlings from a 2 acre plantation of this clone with a 2 mile isolation from other rubber plantations. The growth is generally satisfactory, and all plants have been manured with a complete mixture in 1951.

Large Scale Clone Trial, 1949 Clearing, 30 Acres, Hedigalla.

Hedge-planting 6' × 45' was carried out in this area giving approximately 160 planting points per acre. 24 new clones derived locally from high yielding Prang Besar and Tjikadoe seedlings were planted in 1932, and 1933. The controls include clones PB.86 and RRIM.501. Other clones of interest in this clearing are NAB.16, 17 and 20, which had sufficient budwood in the nurseries for propagation in 1949. The planting of this area was completed in July 1949. The growth for two years has been quite satisfactory. The planting distance in this area is of particular interest as "hedge planting" methods have been very favourably reported on in Indonesia. In January 1952, coffee was planted between hedge rows as a subsidiary crop.

Clone Trials Hedigalla, 1950 Clearing, 20 Acres.

This area which was first prepared for south-west planting in 1950 was used for planting 3 separate clone trials from October, 1950 to July 1951.

Experiment I.

Material.—New Chaemara clones, CH.2, 3, 4, 8, 26, 29, 31, 32. (Controls) LCB.870 and PB.86.

Plot size.—25 trees, Replications 3.

Planted October, 1950.

Experiment II.

Material.—RR.108, 116, 134, 195, PB9/82, DAR 34, 154/41N, 141/41N, (Controls) PB.86, LCB.870.

Plot size.—25 trees, Replications 3.

Planted June, 1951.

Experiment III.

Material.—Clone OE.1 (New clone from Indo-China), RR.38, 39, 43, 52, 53, 54, 119, 163, 181, DAR.33 (controls) PB.86, LCB.870.

Plot size.—25 trees, Replications 4.

Planted August, 1951.

Budwood Nurseries.

The following budwood was issued from our nurseries for multiplication on Estates and Small Holdings Department.

Clones	No. of yards
PB.86	604
NAB.3	2
NAB.12	11
NAB.15	29
NAB.16	10
NAB.17	15
NAB.20	32
RRIM.501	24
RRIM.511	13
RRIM.513	14
PR.107	6
BD.10	1
LUN.N.	1
BS.3	2
BR.2	1
AV.157	1
AV.163	1
PB.23	1
PB6/50	1
AV.255	6
LCB.870	121
Total ...	896

In addition to the above 671 yards of clone PB.86 were issued to the Small Holdings Department.

Correspondence.

Inward	269
Outward	268

General.

3 Graduate Research Assistants appointed in January, 1951 worked under the supervision of the Botanist. They were given a preliminary training in general rubber planting problems, and the layout of statistical field experiments and analyses of experimental data. They were appointed as Research Assistants to the Botanist, Chemist, and Agronomist.

Research Laboratories,
Dartonfield,
Agalawatta.
14th February, 1952.

REPORT OF THE OIDIUM RESEARCH OFFICER AND MYCOLOGIST FOR THE YEAR 1951

By

H. E. Young.

Staff.

Dr. Young took over the duties of Acting Director in February and of Director in September. Mr. D. M. Fernando (Assistant) was granted a Technical Aid Scholarship for training in Canada under the Colombo Plan and proceeded to Canada on 27th July to undertake further training in Plant Pathology at Mc.Gill University.

Owing to these arrangements the work of the Department was considerably hindered.

Ir. J. H. Van Emden was appointed Mycologist and Oidium Research Officer and took up duties at the Institute in December 1951 enabling full scale work to proceed.

General.

The Oidium season this year was particularly severe in almost all rubber growing districts of the Island. The basis of this heavy infestation is thought to be the long dry period experienced in the latter portion of 1950. During this period soil moisture conditions became very dry particularly in elevated areas and many trees were forced to defoliate prematurely. These trees commenced to refoliate in November and December and were checked again by the normal wintering period, after which refoliation was continued.

This long refoliation period provided an opportunity for the mildew to develop in sufficient quantities to heavily inoculate the rubber at normal refoliation time. The weather conditions remained very suitable for mildew development in that rain was scattered and not continuous.

On some estates defoliation due to mildew attack was so continuous that twig dieback occurred followed by invasion by *Botryodiplodia theobromae* which caused severe branch dieback necessitating remedial measures.

The mildew caused heavy flower fall with consequent poor seed set. This was reflected by a poor seed crop in August-September in many areas.

The dates of clonal winterings and refoliations are given in the annual report for 1950.

Refoliation was unduly protracted in many areas the trees refoliating as many as four times with resultant meagre canopy and death of twigs. The disease followed the usual course described elsewhere and was present throughout the year reviewed on the weed *Euphorbia pilulifera* as well as on rubber.

Dusting Trials.

Trials were carried out with a new product "Activated" sulphur manufactured in Italy. This material consists of sulphur fused with carbon and ground to the required fineness. Its action depends largely on quick heat absorption by the black particles resulting in rapid volatilization of the sulphur giving a high concentration of sulphur gases which have a rapid

killing effect in regard to powdery mildews such as *Oidium heveae*. The black cloud of sulphur dust is also very easy to see during dusting operations and enables one to judge the area dusted conveniently.

It was found that equivalent control of rubber mildew was given by the use of this product at half the dosage rate of normal dusting sulphur. The product was however at the time more than double the price of ordinary dusting sulphur and could not then be considered for commercial use unless normal sulphur was unobtainable or the price ratio of the two materials altered.

Adequate control of *Oidium heveae* was obtained by the use of either this material at 4-5 lbs. per acre per round or normal dusting sulphur at 10-12 lbs. per acre per round despite the severe season and it was again observed that early dusting before the epiphytotic begins is the key to control. Waiting for mildew to become evident before dusting is courting disaster.

The dusting schedule advised was proved adequate when properly adhered to and resulted in clean leaf in the area used for the trial in the Matale district.

Sulphur Dusts.

A large number of samples of dusting sulphur from estates and companies was examined and reported upon as to suitability for oidium control. On the whole the samples were found to be of suitable specification due to the efforts made in the preceding year to have sulphur imported for dusting for mildew control on rubber purchased according to recommended qualities of fineness and purity.

A number of samples which were unsatisfactory found to be drawn from old stocks purchased prior to the present recommendations.

Owing to the world sulphur shortage and despite persistent attempts by importers and the Institute to obtain supplies of dusting sulphur it appears that the next oidium season will be marked by lack of control of the disease due to the shortage of dusting sulphur.

Dusting Equipment.

The "Noidium" duster which was fitted with a twin bend outlet duct gave a very satisfactory performance and in dust spread etc. proved itself at least equivalent to other machines on the market whilst being more easily portable. Arrangements were made by the makers of this machine to fit twin bend outlet ducts to old machines or new models as required.

Deliveries of four stroke engines desired for this machine have been unsatisfactory and cannot as yet be fitted for commercial use. The one machine of this type obtained by the Institute gave a very satisfactory performance and proved superior in use to other machines on the market.

Lime Sulphur Spraying.

An experiment in which a lime sulphur mixture (sulfinette) was applied to rubber trees as a control for rubber mildew was successful in so far as it went. The lime sulphur gave very good control when used with the "Portamist" mist blower. This machine however is not adequate for the spraying of trees over about 15 ft. in height and is therefore impracticable for general plantation purposes.

The Fungus.

It was again found that the fungus is in continual growth on new leaf and also present on its natural host *Euphorbia pilulifera* which was discovered and reported last year. The fungus has been many times transferred from *Euphorbia pilulifera* to rubber and vice versa during the period with no difficulty when the correct technique is applied.

Clonal Resistance to Mildew.

Clone LCB.870 at the Kepitigalla Clone Museum again demonstrated its field resistance to the disease and refoliated normally with full foliage as compared with the many defoliations caused by the fungus in respect to other clones (58) in the museum except where dusted or sprayed.

The LCB.870 plot stands out in marked contrast to the rest. No other clone has yet been found with resistance approaching that of LCB.870.

Two trees from commercial estates which were reported to be oidium resistant were multiplied at Dartonfield for further investigation.

Breeding for Resistance.

In continuation of the breeding programme some 1474 crosspollinations were carried out using LCB.870 as one of the parents with the object of obtaining a clone combining the resistance of LCB.870 and the high yield of the other parent. Of the 1474 pollinations 430 were successful and a good seed crop was obtained in August. The seed was planted at Dartonfield to be studied for resistance in the nursery and any promising seedlings multiplied for more detailed trial. The pollinations carried out and the results obtained are shown in the accompanying table.

Results of Hand Pollination with LCB.870.
at Kepitigalla Estate, Matale.

Clone	No. of Pollination	No. Successes
PB.86 ...	600	211
GLS.1 ...	455	114
PR.106 ...	207	26
LCB.870 ...	61	1
LAV.28 ...	13	8
NAB.18 ...	8	—
NAB.8 ...	25	2
RRIM.501 ...	25	6
RRIM.506 ...	10	8
NAB.19 ...	10	3
RRIM.514 ...	10	4
NAB.5 ...	10	2
PR.17 ...	10	5
RRIM.500 ...	10	4
NAB.6 ...	10	3
RRIM. ...	10	3
Total ...	1474	430

In all some 900 seedlings were obtained.

Crown Budding for Resistance.

As a provision for the demand for LCB.870 budwood for crown budding purposes some 1200 buddings of this clone were made and put out in a budwood propagation nursery. The demand for this budwood by planters

is increasing rapidly. Any material available has been disposed of for propagation by rubber growers for crown budding purposes. As far as possible the distribution has been made as wide as possible with preference to the worst mildew affected areas. It is hoped with the increase in budwood supplies provided for, that adequate provision for all demands has been made. In the meantime a number of estates have put out trial plots and made provision for further multiplication of the budwood supplied to them.

Advice and instruction in the crown budding technique has been provided where required and good results have been obtained by the growers.

Crown Budding Trial, Hedigalla.

The 250 pairs of twinned seedlings crown budded one of each with LCB.870 and the other with TJ.1 as a comparison of the effect of yield of the crowns on the tappings panels was continued. Whilst the area is still too young for tapping, girth measurements of the trees were made in February and the LCB.870 crown budded trees showed a higher increment than those budded with TJ.1. This is very satisfactory and is keeping with the vigorous nature of the resistant clone.

There was complete occlusion of the wound of the top budded trees at the bud point. The original buddings were carried out in October 1949 and there should be no abnormal damage from wind etc. henceforth in these healed trees. The scions have now evened in girth with the stocks.

At the Kepitigalla clone museum top budding of 10 year old PB.86 plants was carried out successfully in the PB.86 trial plot. Half the plot was left untouched. The object is to get an early indication of the effect of LCB.870 crown on the latex from a PB.86 panel. The buddings showed very vigorous and satisfactory growth and it is expected that tapping for latex quality will be able to be carried out next year.

The 600 plants crown budded on Kepitigalla estate under the writer's supervision have shown extremely satisfactory growth and are progressing rapidly.

Control of Oidium by Defoliation.

It was considered that if defoliation of any particular field or estate could be obtained by artificial means just before the normal wintering season that the following effects in some degree might be expected.

(a) An even defoliation would be obtained resulting in,

(b) the removal of infective material from the trees which would.

(c) allow the new foliage to develop before the mildew could develop to a serious stage and thus procure a reasonable canopy without suffering much further defoliation due to the fungus attack.

(d) An earlier refoliation might occur which would be perhaps in weather conditions less suitable for Oidium attack.

(e) A more even refoliation might occur and thus provide a shorter period for infection development.

A survey of practicable methods of defoliation was made and it was decided that the product calcium cyanamide in the dust form sold under the proprietary name "Aero Cyanamid" showed most promise. This material is used for the defoliation of cotton plants in preparation for mechanical harvesting.

A trial quantity was obtained and tried in July with a "Noidium" sulphur dusting machine with satisfactory results.

A commercial scale supply was then obtained and some 25 acres of budded rubber were treated at Nivitigalakele in November and December. Satisfactory defoliation was obtained using the dust at a rate of 30 lbs. per acre in the first round and a further 5 lbs. per acre in a second round when previously unaffected leaves were "spot" dusted.

Weather conditions necessary for satisfactory dusting and defoliation were found to be :

(1) A wet leaf surface such as after a dewy night.
(2) Absence of mist as the dust does not rise in such weather.
(3) Absence of rain for about eight hours after dusting.

It was also found that new leaf was not very susceptible to the treatment possibly owing to its waxy cuticle. Mature leaf dropped some five to eight days after dusting under good dusting conditions.

With the twin bend outlet type machine it was found that the labour suffered no ill effects as the dust is directed away from the workers.

Dusting was carried out by carrying the machine to strategic points in succession so that the whole field may be treated from these points.

The "Whirlwind" type duster was found to be not powerful enough for dispersing this dust which is heavier than sulphur and also the machine itself is too heavy for practicable manual transport.

The new type "Noidium" duster with four stroke engine built according to the recommendations of this Institute was found to do an excellent job.

The "Cyanamid" dust has the additional property of being an excellent source of nitrogen and is practically equivalent weight for weight with ammonium sulphate. If this type of fungus control proves successful the manuring programme in respect to nitrogen may then be cut down by an equivalent amount.

Results of the treatment in regard to Oidium control will not be available until 1952. It is considered that one or two rounds of sulphur dusting may have to be carried out following bud break in some cases.

Other than *Oidium heveae* investigations the work carried out was mainly advisory.

Root Disease.

Fomes lignosus : this is becoming a more important problem with the current replanting policy being carried out on most estates where the old seedling rubber is being replaced by either budded rubber or clonal seedlings.

Observations have showed that the parasite is often present on the root system of the old trees although these trees do not exhibit above ground symptoms. In other words the fungus is present in a state in which the tree is tolerating its presence without much primary damage being caused. The presence of the fungus in this nonvirulent state relative to the old tree does not however mean that it can be ignored. That the reverse is the case has been shown from the Institute's own replantings where numerous new infection sites and casualties in the new plantings have occurred. It has become obvious that at uprooting all old trees should be inspected for the presence of the parasite and if present, eradication measures taken for each case discovered.

In the case of areas where the old rubber is poisoned and allowed to stand and the new planting carried out under the old rubber there is a grave risk of Fomes outbreaks occurring in the new planting if Fomes is present. The sodium arsenite used for poisoning the old rubber does not affect the fungus directly. It causes quick death of the tree and its roots and thus allows normal wood rotting fungi to get to work quickly. When the wood is rotted properly *Fomes lignosus* cannot exist further on that tree. This process of rotting however may take several years during which time the parasite is able to survive and attack the roots of the young plants if able to contact them.

As stated above the fungus is frequently present although there are no above ground symptoms. Poisoning, unlike in uprooting, does not allow of these hidden infections being noted and when present these infections may cause subsequent damage in the new planting. It appears therefore that the practice of poisoning is a dangerous one and should not be used if possible.

It is of interest to note here that living *Fomes lignosus* material was found on several occasions on roots and logs of old rubber trees uprooted in 1947 i.e. active infection was present 4 years after clearing. The clearing of Fomes sites particularly of the larger roots etc. which take a long time to decay is therefore most important.

Fomes Noxious.

A few cases of this relatively unimportant disease occurred.

Ustulina zonata.—As with the former species this fungus did not cause much damage during the year.

Phytophthora.—In June a minor outbreak of Phytophthora leaf fall occurred on many estates but the clearing up of the weather prevented any serious development.

A number of cases of Phytophthora attack on young plants in field and nursery were reported. In these cases the fungus attacked leaves and new green shoots. In all cases observed the attack was arrested by pruning out and destruction of infected material with the addition of several rounds of spraying with "Perenox" at a strength of 4 oz. per 10 gallons of water.

It was found that the addition of "Alboleum No. 2" to the spray increased its spreading and sticking qualities considerably.

In all cases observed including those occurring on the Institute's estates the fungicide as used proved a satisfactory remedial measure.

Brown Bast.

A number of enquiries were received concerning brown bast. This became a serious problem on some estates due to over tapping stimulated by the satisfactory prices for rubber.

Hypocrella Reineckiana.

This fungus, a parasite on scale insects attacking rubber trees caused a number of enquiries. It has been getting more common and its orange coloured protuberances excite curiosity in those to whose notice it is brought for the first time.

Birds-eye Leaf Spot.

This caused infrequent damage of any importance being recorded on very few occasions from nurseries. Spraying procedure was recommended for its control.

Die-back.

A number of cases of dieback due to secondary infection by *Botyodiplodia theobromae* were reported. The primary cause was in the majority of cases an initial twig dieback caused by starvation due to repeated attacks by Oidium heveae. The Diplodia damage was in some estates serious and killed trees right to the ground or caused extensive branch dieback.

Scale Insects.

A number of cases of death and damage to young plants particularly in nurseries due to the attack of Lecanium nigrum were reported from estates. Similar attack occurred in the Institutes nurseries at Nivitigala-kele division. In all cases the disease was controlled by the application of white emulsions such as "Alboleum No. 2" except in cases where the plants had been so badly affected before treatment that recovery was impossible.

Mite Injury.

Injury by mites to nursery seedlings and budwood nurseries was reported in a number of cases. This was found to be due to the yellow tree mite. It was controlled by lime sulphur spraying or by sulphur dusting.

Correspondence	Inward :	408
	Outward :	421

Research Laboratories,
Dartonfield,
Agalawatta.
22nd February, 1952.

REPORT OF THE AGRONOMIST 1951

By

D. H. Constable

Staff.—The Soil Chemist's department was reopened on April 16th, 1951 on the arrival of the Agronomist, and Mr. A. J. Jeevaratnam, B.Sc. Agric. was appointed on probation as Research Assistant. Mr. Seemon Singho was apponted Laboratory Attendant.

General.—After some study of the problems facing the planting industry two main lines of research were decided upon as well as a number of ad hoc investigations.

The first line of work is the accumulation of practical data regarding the effect on commercial estates of various levels of fertilizer application. Such estates are to present as broad a picture of Ceylon Rubber land as possible. Also to be included in this work are the present manurial trials at Dartonfield and the proposed manurial trials at Hedigalla.

The second line of work is the chemical investigation of external factors which may have a direct bearing on the growth and yield of Hevea. This work is intended to cover soil analyses of known good and bad areas in an endeavour to characterize such areas. Analysis of leaves of trees in good and bad areas for the same purpose are planned. Deliberate induce-

ment of deficiencies in young plants, the recording of the external symptoms of such deficiencies and the chemical analyses of the young plants are proposed. Finally the investigation of symptoms found on estates which suggest naturally occurring deficiencies is projected.

Thirdly, under the heading ad hoc investigations come the vegetative propagation of rubber by cuttings, spacing trials in particular with LCB.870 to see if closer spacing will raise its yield per acre, tapping trials for more intensive systems and to offset rain losses, and milling water analyses in connection with the non lamination of crepe laces in certain factories and of variations in response to RPA.3 for the Chemistry Department.

The actual progress of work will be considered under these headings.

Manurial Experiments Dartonfield.

(a) **NPK 19½ Acres — Planted 1938.**

The design of this experiment has been reported in previous years. The phosphate treatment alone continues to give the best yields but this year the average figures for yield are not statistically significant though the figures for girth are highly significant. This is due to the fact that the only test for average fertilizer effect is the clonal fertilizer interaction and a study of the figures makes it probable that different clones have appreciably different manurial requirements. This matter is being further looked into and the average results for 10 years have been submitted to Rothamstead for their comments. It is hoped that it will be possible to publish a fuller appreciation of this experiment in one of the quarterly circulars in the light of their opinion. The figures for yield and for girth in 1951 are given in Tables I and II.

TABLE I.

Field in lbs. per acre (calculated) in 1951 NPK Experiment planted — 1938.

Treatment	O	N	P	K	NP	NK	PK	NPK	Compost	Average	
TJ.1	806	514	1125	675	1439	1077	838	933	1133	949	S. E. of a clonal mean $=\pm 52$
PB.183	409	602	863	493	657	552	838	590	942	661	
W.259	739	405	472	374	364	399	514	403	421	455	
HC.28	694	536	742	783	632	632	678	665	495	651	
PB.86	932	883	1222	899	949	1050	948	955	941	975	
PB.186	696	714	793	511	825	969	793	755	1003	785	
Average	713	609	869	622	811	780	768	717	822	746	

TABLE II.

Girth in inches NPK Experiment.

Treatment	O	N	P	K	NP	NK	PK	NPK	Comp.	Average	
TJ.1	25.0	23.2	27.0	21.5	26.6	25.5	26.1	25.7	29.3	25.5	
PB.183	23.1	23.6	28.7	23.7	28.0	23.9	28.4	27.3	28.2	26.1	S. E. of a treatment mean $=+.74$ S. E. of a clonal mean $=\pm .60$
W.259	28.4	26.5	28.1	25.5	28.8	23.9	27.2	27.9	26.0	26.9	
HC.28	26.6	26.3	27.7	29.3	29.2	28.8	30.6	31.0	29.1	28.7	
PB.86	25.6	24.9	28.9	24.5	27.2	25.8	26.1	29.1	29.5	26.8	
PB.186	22.4	26.9	25.5	19.8	28.4	29.8	26.9	27.9	31.1	26.5	
Average	25.2	25.2	27.6	24.1	28.0	26.3	27.6	28.2	28.9		

A new method is being used in reporting yields in the manurial experiments. All the experiments at Dartonfield are tapped commercially and the yields recorded on a field basis. Thus we have an average yield for this 19½ acres of 746 lbs./acre. Experimental tappings are done once a month on all the plots (54) in this field and the yields of each plot in grams are therefore accurately determined 12 times per annum. The average of these 54 plot determinations is accordingly representative of the field average (i.e. 746 lbs. per acre) and the conversion factor given by this is applied to each of the separate yearly plot totals to give the figures shown. This method is also used on the two following experiments.

As regards girth all treatments except N,K and NK have given significant increases. There is no difference beween P and the various combinations of P which suggests that the phosphate manured plot is catching up the combination treated plots with the passage of time.

Nitrogen Level Experiment 9½ Acres — Planted — 1936.

This experiment has been described in previous years. It is somewhat complicated in that it represents a trial of three clones together with stumped buddings, budded stumps and field buddings, as well as the three nitrogen levels.

In this experiment the yield has increased with the increase in nitrogen application but the effect is not significant.

On the other hand field buddings are significantly below the other two an effect which has been marked for years. Avros. 49 is significantly worse than SR.9.

TABLE III.

Yields in lbs. per acre (calculated) for Nitrogen Level Experiment in 1951.

Treatment	N_0 SB	N_0 BS	N_0 FB	N_1 SB	N_1 BS	N_1 FB	N_2 SB	N_2 BS	N_2 FB	Average Yield
Av.49	754	655	592	641	612	604	746	656	790	672
PB.25	765	681	586	556	977	585	951	810	723	749
SR.9	748	861	675	969	901	713	797	895	693	806

Av. yields	N_0	702	SB	780	S.E. of any mean = ± 32 lbs./acre.
	N_1	739	BS	783	
	N_2	784	FB	661	

Placement of Fertilizer 6½ Acres — Planted — 1941.

This experiment is a comparative trial of broadcasting, forking, pocketing, and sulphate of ammonia broadcast with PK placed in pockets. Five clones of the RRIM series plus a plot of clonal seedlings are used for the test. Forking has given the best results though not to any significant extent.

The figures for this plot are shown in Table IV.

The chief interest lies in RRIM.501, the average yield of the 6½ acres is 773 lbs. per acre (commercially) and at every test tapping approximately twice as much rubber is obtained from the RRIM.501 plot as from any of the others.

TABLE IV.

Yield in lbs. per acre (calculated) Placement of Fertiliser Experiment 1951.

	RRIM 500	501	506	514	520	Seedling	Average Yield	
Broadcast	776	1077	426	864	552	703	733	S.E. of a
Forking	720	1635	422	714	489	891	812	Treatment
Pocketing	761	1445	543	606	521	797	772	mean = ±57
B'cast N Pocket PK	643	1172	700	743	449	864	762	S.E. of a clonal mean = ±71
Average	725	1280	523	732	503	814		

There seems little reason to doubt therefore the calculated average yield of 1280 lbs. for RRIM.501 which is incidentally from one acre of this clone. However the same clone has not given nearly such good results at Nivitigalakele (see Botanist's Report).

In addition to the foregoing experiments manurial trials have been started at a number of points in the Island. So far the estates selected are Lochnagar in Matale, Kepitigalla at Ankumbura, Ardross in Kegalle, Degalessa in K.V., Epping Forest in Horana — Ingiriya, Ambatenne in Kalutara and Mirishena. On all except the first and last the experiments have been laid out and manures applied.

The general form of the experiment is a test of Nil, P, NP, PK and NPK and as far as possible 5 × 5 latin squares are being employed using areas of 600-1,000 trees. On Ardross the extreme steepness of the land has made it necessary to curtail the experiment to a comparison of Nil, P and NPK.

In addition, through the courtesy of the Chilean Nitrate Corporation, we have been promised sufficient quantities of sodium nitrate to keep three experiments going for ten years. Sodium nitrate is an alternative to ammonium sulphate and its particular values are that the nitrogen is more readily available, that the residue does not cause acidification of the soil and that as a naturally occurring product it contains "trace" elements which may be of value. Experiments to compare it with sulphate of ammonia are being arranged at Lochnagar (as part of the main experiment) Eladuwa in Kalutara district and at a third estate as yet unchosen.

In these experiments it has been necessary to accept whichever clonal variety was being planted so a further experiment is in process of starting on the Institute's estate at Hedigalla. This experiment will try the same five fertilizer combinations in conjunction with PB.86, LCB.870, PB.86 top budded with LCB 870, AV.255 and Kepitigalla Clonal Seedlings.

It is particularly hoped that it may be possible to assess whether all clones have the same fertilizer requirements a point on which some doubt has been cast by the present Dartonfield experiments.

Soil Analysis and Deficiency Work.

As far as the actual analysis is concerned little work has been done upto the present. A combined spectrophotometer and flame photometer is on order from the U.S.A. and is expected to arrive early in 1952. This apparatus is essential for trace element work on a wide scale and necessary if any large number of samples are to be analysed for the major nutrient contents.

Some preliminary studies of soil have been made and suggest that the average clay content is very low ($<10\%$) and humus practically non existent. What clay there is appears kaolinitic and has very little capacity for holding nutrients (ca. ½ milligm. equivalent per 100 gms of soil). Such a low capacity suggests too that soil testing for acidity by chemical indicators will not give accurate results and tests have tended to confirm this view, the resuuts tending to reflect the reaction of the indicator rather than that of the soil under test. Arrangements have been made to obtain a suitable testing apparatus to carry out this work physically.

As regards field work a number of estates have been located on which clear symptoms probably due to trace element deficiency have been discovered. In addition on one of these (South Charley Mount) applications of magnesium sulphate recommended last year are considered by the superintendent to have been very beneficial as a treatment for "yellowing" of the rubber foliage. On another estate (Polgahakande) the same applications have had no effect.

A start has been made on the field identification of the symptoms occurring on Perth Estate. Areas have been marked out and solutions of all elements believed to be concerned in plant nutrition have been applied to the cover crop (*Pueraria phaseoloides*) which has the same symptoms (marginal leaf yellowing) as the rubber. It is too early as yet to state whether an improvement is manifest. Similar work is about to be undertaken on Hewagam Estate where the same symptoms accompanied by the presence of an area of intervenal fading have been found.

In the laboratory, twinned rubber seedlings are now being raised in a washed sand media, without any nutrient supply. Slight symptoms of the intervenal fading type have started to appear and the use of pairs of "twins" to compare the effects of addition of the various nutrient elements is now under way.

A number of requests have been received for soil analyses on estates where declining fertility is suspected. Unfortunately it has not been possible to accede to these requests for the reason that no advice could be given as the result of such analyses. Before such work can be of practical value to the planter it is necessary to have considerable numbers of analyses covering the various estate types (good, medium, and poor) in order to be able to state both the desirable and the essential quantities of each different nutrient element.

Such work will get under way with the arrival of the spectrophotometer.

Ad hoc Investigations.

A start has been made on the vegetative propagation of rubber from cuttings, by the building of a bin of suitable type to maintain equable conditions during the rooting process and by the procurement of rooting hormones which are generally of some help to the process. As semi-drought conditions prevailed during the latter half of November and the whole of December no further moves were made on this work which generally requires extremely damp conditions.

The design of a spacing trial at Hedigalla has been completed and lining for holding is beginning. An area of 13 acres is being used with five clones viz: LCB.870, PB.86, PB.86 top budded with LCB.870, AV.255 and polyclone seedlings. Spacings of 200, 175, 150, 125, and 100 trees to the acre are to be used with no thinning and losses will be replaced for as long as is practicable.

Arrangements have also been made to use one of the budded rubber areas no longer required for manurial work to carry out further trials of tapping systems. The underlying idea is to see how far "afternoon" tapping and similar systems may safely be carried. This trial will also include "ladder" tapping which was recently been advocated from the East Indies.

The last investigation has been carried out on behalf of the Chemical Department. Complaints in regard to the non-lamination of crepe laces have been received from some planters. It was felt that this might be connected with "hard" water and therefore this aspect of the problem is being investigated. To date waters from 13 estates have been analysed for eight components in each sample. The general level of rubber factory water tested so far is extremely soft apart from Matale district which is of medium hardness.

It is hoped that these analyses may also provide information to assist in the remedy of the occasional failures which occur in the use of the R.P.A.3 bleaching process to give water white crepe.

During the year thirty six visits were paid to commercial estates on advisory and investigational duties.

Correspondence	Inward	...	286
	Outward	...	211

Research Laboratories,
Dartonfield,
Agalawatta.
7th January, 1952.

REPORT OF THE ESTATE SUPERINTENDENT FOR 1951

By

G. W. D. Barnet

Visiting Agent.—Mr. J. D. Farquharson was appointed Visiting Agent by the Rubber Research Board. He visited the Institute's properties on 7th March and 10th August. Reports on his 2 visits were submitted to the Board.

Superintendent.—The writer assumed duties as Estate Superintendent in February 1951.

Dartonfield Group.

Dartonfield Division

		A.	R.	P.
*Mature Rubber Seedling Acres	...	64	3	00
Mature Rubber Replanted Areas	...	44	3	22
Immature Rubber Replanted Areas	...	44	0	00
Nurseries	...	2	0	00
Paddy Field	...	0	1	22
Buildings and Roads	...	20	1	36
Forest, Scrub, etc.	...	2	2	19
Total	...	179	0	19

* Including 35 acres cleared for replanting in 1952.

		A.	R	P.
Nivitigalakele Division				
Mature Budded Rubber Areas	...	106	3	18
Immature Budded Rubber Areas	...	28	0	31
Nurseries	...	15	3	25
Buildings and Roads	...	2	0	15
Forest, Scrub, etc.	...	20	2	23
Paddy Field	...	0	2	00
Total	...	174	0	32
Hedigalla Division (New Planting)				
Mature Rubber Areas	...	22	0	06
Immature Rubber Areas	...	134	0	06
Nurseries	...	2	0	00
Buildings and Roads	...	6	0	29
Forest, Stream Reservations, etc.	...	820	1	39
		985	2	00
Grand Total	...	1339	3	11

Elevation.—Factory at Dartonfield — 215 ft.

Rainfall.

Rainfall figures for 1948—1951 are shown below :—

	1948 ins.	1949 ins.	1950 ins.	1951 ins.	5 Years' average 1947—51 ins.
January ...	7.21	6.48	2.05	13.21	9.59
February ...	5.65	0.38	5.77	2.12	3.64
March ...	11.52	5.87	9.51	11.61	11.03
April ...	13.55	19.58	11.40	14.60	14.49
May ...	17.97	18.73	16.38	23.40	19.15
June ...	24.12	16.29	9.48	23.20	20.44
July ...	6.00	12.37	9.31	23.54	16.64
August ...	9.19	23.81	8.36	1.76	8.90
September ...	14.94	10.97	11.30	18.57	15.46
October ...	22.25	24.73	26.88	11.98	18.08
November ...	19.71	13.38	7.14	17.80	15.49
December ...	10.22	6.44	2.54	5.03	7.78
	162.33	159.03	120.12	166.82	160.69

There were 231 wet days in 1951 as compared with 221 wet days in 1950. The months of May, June and July were the wettest and each had over 23 inches of rainfall.

Crop.

Yield Records of Individual Fields

Dartonfield	Acreage	Total Yield	Yield per Acre
Old Seedling Rubber ...	45 Acres	40,011 lbs.	879.4 lbs.
1934 Replanted Area ...	7½ „	6,603 „	880.4 „
1936 „ „ ...	9½ „	7,075 „	744.7 „
1938 „ „ ...	19½ „	14,553 „	746.3 „
1939 „ „ ...	2 „	1,264 „	632.0 „
1941 „ „ ...	6½ „	5,026 „	773.2 „
Total acreage in Tapping	90½ „	74,532 „	823.5 „

Nivitigalakele.		Acreage	Total Yield	Yield per Acre
1926 Clearing	...	13 Acres	8,636 lbs.	664.3 lbs.
1927 „	...	10 „	7,415 „	741.5 „
1928 „	...	15¾ „	10,904 „	692.3 „
1935 „	...	28½ „	23,488 „	824.1 „
1939 „	...	10¼ „	9,053 „	883.2 „
1940 „	...	9¾ „	7,798 „	799.8 „
1940 Swamp Area	...	3¼ „	1,556 „	478.8 „
1941 Clearing	...	7 „	6,949 „	992.7 „
1942 „ „	...	5 „	2,804 „	560.8 „
1944 „	...	4½ „	1,296 „	288.0 „
Total acreage in Tapping		107 „	79,899 „	746.7 „
Hedigalla.				
1943 Clearing	...	11 Acres	5,045 lbs.	458.6 lbs.
1944 „ „	...	14 „	3,094 „	221.0 „
Total acreage in Tapping		25 „	8,139 „	325.6 „
Grand Total	...	222½ „	162,570 „	730.7 „

		1951	1950
Estimated Crop	...	141,190 lbs.	136,780 lbs.
Harvested Crop	...	162,570 „	131,646 „
Excess	...	21,380 „	—
Loss	...	—	5,134 lbs.

Tapping.

Tapping was stopped on 10th February to rest the trees during refoliation. During this period new tapping cuts were marked in the Budded Rubber Areas where change of panels were necessary. In *Dartonfield* out of an area of 35 acres to be replanted in 1952, it was possible to slaughter tap only 15 acres. The balance of 20 acres was slaughter-tapped for a number of years and did not have any tappable bark left. The trees in the areas due for replanting in 1953 and which will be felled in 1953 were marked with 2 upward cuts in adition to the normal 2 half-spiral cuts — i.e. 4 S/2, d/2, 400%. In the Budded Rubber Areas the following additional trees were brought into tapping :—

1941	Clearing Field No. 10 — Stock Scion Expt.	6½ Acres	...	26 trees
1939	„ „ No. 9	2 „	...	4 „
1938	„ „ No. 8	19½ „	...	12 „
1936	„ „ No. 7	9½ „	...	2 „
		Total	...	44 „

In Nivitigalakele.—265 out of 364 trees in the 1944 Clearing had the required girth measurements and were brought into tapping.

In Hedigalla.—All the tappable trees in the 1944 Clearing were brought into tapping.

Tapping recommenced on the 5th March on the whole Group.

Analysis of Tapping Rounds for 1951 (1950 figures in brackets).

	Wintering	Early Tapping	Late Tapping	Very Late Tapping	No. Tapping	
					Rain	Holiday
1st Quarter	24 (28)	48 (49)	9 (—)	— (–)	1 (—)	2 (2)
2nd ,,	— (—)	47 (41)	21 (16)	6 (7)	23 (9)	2 (5)
3rd ,,	— (—)	64 (43)	14 (25)	4 (7)	5 (11)	– (–)
4th ,,	— (—)	72 (56)	16 (11)	— (–)	4 (8)	3 (3)

Manufacture.

A summary of the grades prepared during the year.

			Total in lbs.	Percentage of Grade
Ribbed Smoked Sheet	No. 1	...	2,782	1.66
— do —	No. 2	...	166	0.09
— do —	No. 3	...	—	—
Latex Crepe Nos. IX &	No. 1	...	65,340	39.11
— do —	No. 2	...	19,447	11.63
— do —	No. 3	...	26,910	16.11
Scrap Crepe	No. 1	...	18,928	11.33
— do —	No. 2	...	9,415	5.64
— do —	No. 3	...	1,826	1.09
Creamed Latex		...	17,112	10.24
Experimental Latex		...	480	0.31
Sole Crepe Nos. 1 and 2		...	4,643	2.79
	*Total	...	167,049	100.00

* Includes 4,479 lbs. Bought Latex.

Factory.

Portions of the roof guttering were renewed where required.

Machinery.

The consulting Engineers, Messrs. H. W. Hammond & Co. inspected machinery and electrical equipment in March.

Power Plant.

(a) 80/90 B.H.P. National Oil Engine worked satisfactorily during the year.

(b) 55 K.W. 230 Volt Compound Wound Generator driven by the above engine worked satisfactorily and in yood order.

(c) 52 B.H.P. Vertical Ruston Engine is being completely overhauled by an Engineering Firm. This engine is obsolete and it is practically impossible to obtain "spares" for it.

(d) 32 K.W. 230/240 Volt compound wound generator coupled direct to the above engine is in good order.

(e) 20 B.H.P. Gardner Oil Engine (Cold Start), which was completely overhauled by the Senior Artisan, worked satisfactorily and is in good order.

(f) 12 K.W. 230 Volt Generator driven by the above engine worked satisfactorily and is in good order.

(g) Air Compressor driven by a 2 H.P. Motor is in good working order. The motor was overhauled by a firm of electrical engineers and is working satisfactorily.

(h) 5 B.H.P. National Engine wos completely overhauld and is in good working order. This engine drives an electric dynamo 2½ K.W., 230 Volts and a vertical double acting pump which are also in good working order.

The electrical wiring in the Factory was found to be satisfactory by the Visiting Engineer.

Machinery in Factory.

(a) 26" water-cooled grooved mill driven by a 25 H.P. electric motor are both in good working order.

(b) 26" water-cooled smooth mill driven by a 25 H.P. electric motor. A new roll was ordered to replace the mild steel front roll which was installed during the war as a temporary measure. This roll will be fitted on during the "resting period" in 1952.

(c) Multiple Roller

(i) 24" Smooth Sheeting Mill driven by a 1½ H.P. electric motor. The bearing blocks on this mill were rebushed.

(ii) 24" Spiral Sheeting Mill driven by a 1½ H.P. electric motor. The field windings of the motor was faulty and were re-wound

(d) Experimental Rollers

(i) 12" Grooved Mill
(ii) 12" Smooth Mill

Both these mills and the 5 H.P. electric motor driving them worked satisfactorily during the year. The rolls in both mills require replating.

(e) Baling Press. In order.

(f) Automatic Sprinkler at Smoke House. In order.

Chemical Dept. Machinery in Factory.

(a) 30' Hydro-Extractor driven by a 4 H.P. electric motor. Out of commission at present.

(b) High Speed Disintegrator driven by a 3 H.P. electric motor. Out of commission at present.

(c) Centrifugal Separator driven by a ½ H.P. electric motor. Out of commission at present.

(d) Air Compressor. Out of commission at present.

(e) Latex Evaporator. Out of commssion at present.

(f) Water Filter. Out of commission at present.

(g) Ball Mill driven by a 1 H.P. electric motor out of commission at present.

(h) Colloid Mill driven by a ½ H.P. electric motor is in good working order and in use.

(i) Vacuum Drier and Steam Pump. Out of commission at present.

(j) Steam Vulcanising Press (hand worked). Out of commission at present.

(k) 6 N.H.P. Vertical Cross Tube Boiler. In good working order. The chimney had to be replaced.

Water Pumps.

(a) 4" × 5" Double acting Horizontal Pump by Myers driven by a 5 H.P. electric motor situated by old well. The pump and motor are in good working order.

(b) 4" × 3" Horizontal Double Acting Pump by Lee Howl driven by a 5 H.P. electric motor. This pump was removed from by the storage tank and fitted up in a new pump house by the new well.

(c) The Double Acting Horizontal Pump by Walker & Greig Ltd. driven by a 2 H.P. electric motor has been removed from near the new well as is to be fitted up over the well near the Junior Staff bungalows and additional source of water supply for the in-door sanitation of these bungalows and the Club House.

(d) A new 4" × 5" Double Acting Pump by Myers driven by a 5 H.P. electric motor as be fitted up in the pump house by the storage tank and is working very satisfactorily.

(e) The Centrifugal Pump driven by a 4.5 H.P. electric motor which was also housed in the pump house by the storage tank was not working satisfactorily. As it was also unnecessary, it was rejected and sold on the recommendation of the Experimental Committee of the Rubber Research Board.

Fuel Consumption.

Details of fuel consumption for the period January — December 1951 are given below :—

	Average per hour
National Engine — 80/90 B.H.P.	
Liquid fuel	1.63 gals.
Lubricating Oil	0.13 „
Ruston Engine — 52 B.H.P.	
Diesolene	2.17 gals.
Lubricating Oil	0.21 „
Gardner Engine — 20 B.H.P.	
Liquid fuel	0.75 gals.
Lubricating Oil	0.09 „

Pests and Diseases.

Oidium Heveae.—The incidence of Oidium was very severe. Sulphur dusting was carried out in the budded rubber areas in accordance with the advice of the Oidium Research Officer with excellent results which could be judged by the good foliage on the trees of the dusted areas on Dartonfield, Nivitigalakele and Hedigalla.

Fomes lignosus.—In the mature seedling and budded rubber areas the incidence of this disease was very small. Except for a few cases. all those discovered were located in the 35 acres being felled and cleared mechanically for re-planting in 1952.

Brown Bast.—32 cases of this diease occurred in mature budded rubber areas and were attended to.

Canker Scraping was done where necessary.

Ustulina zonata.—This disease was the cause of the death of 5 trees in the mature budded rubber areas.

Phytophthora palmivora (Secondary Leaf-fall).—The incidence of this disease was mild and negligible.

Other Disease and Causes.—72 trees were blown down and were beyond redemption. Fomes noxius, the longicorn beetle, lightning and die-back due to an unknown cause caused the death of 1 tree each.

Disinfectants.—Applications of 10 per cent Brunolinium Plantarium and Cargilineum B were made to tapped panels during wet and dry weather respectively as a preventive against Phytophthora species (Bark rot).

Loss of Trees.

Division	Clearing	No. of Trees	Cause
Dartonfield	1934	1	Blown Down
	1936	1	„ „
	1936	6	Brown Bast
	1938	4	„ „

Division	Clearing	No of Trees	Cause
Dartonfield	1938	10	Blown Down
	1939	1	„ „
	1941	4	„ „
	1941	1	Brown Bast
	1941	1	Ustulina zonata
Nivitigalakele	1926	10	Blown Down
	1927	2	„ „
	1927	1	Ustulina zonata
	1928	15	Blown Down
	1935	1	Longicorn Beetle
	1935	2	Brown Bast
	1935	6	Blown Down
	1939	1	Died Bark
	1939	13	Blown Down
	1940	1	Fomes noxius
	1940	13	Blown Down
	1940	2	Ustulina zonata
	1941	4	Blown Down
	1942	8	„ „
Hedigalla	1943	2	„ „
	1944	1	„ „
	1944	1	Fomes lignosus
	1944	1	„ „
		113	

Manuring.

All mature budded rubber areas were manured with R-400 manure broadcast at the rate of 2 lb. per tree.

Weeding.—All the above areas were weeded every other month during the year.

Roads, Paths, Etc.—All roads and paths were maintained in good condition throughout the year.

Boundaries.—Fences were repaired where and when necessary.

CAPITAL ACCOUNT.

Agricultural Development.

1947 Clearing — 11 Acres — Dartonfield.

Weeding.—This clearing was weeded once a month during the year and is clean.

Pests and Diseases.—*Fomes lignosus* continues to be the greatest menace in *replanted* areas. The old seedling Rubber trees in these clearings were felled by cutting the lateral roots and digging round the tap roots till the trees crashed to the ground. Only areas *known* to be infected with *Fomes lignosus* were attended to as it would have been uneconomic to grub out all the lateral roots left in the areas. It is hoped that the mechanical felling or, rather, uprooting of trees — no roots being cut at all — will greatly reduce the incidence of this disease in replanted rubber Clearings. In this clearing no less than 114 cases were dealt with during the year.

Manuring.—Saphos Phosphate was forked in between the rows of trees at the rate of 1 lb. per tree in one application.

1950/51 Clearing — 33 Acres — Dartonfield.

Weeding.—Regular monthly rounds of weeding and controlling leguminous cover crops were done during the year. The clearing is clean.

Pests and Diseases.—27 cases of *Fomes lignosus* were attended to in accordance with the advice of the Mycological Department. A few cases of *Phytophthora* (stem disease) which occurred during the wet months of May, June, and July were promptly treated too.

Manuring—R-215 manure was forked in lightly round each plant in 2 applications at the rate of ¼ lb. per plant per application.

1943 Clearing — 7 Acres — Nivitigalakele.

Weeding.—All shrubs, grass and other weeds were uprooted. Desmodium ovalifolium cuttings were planted and are doing well. Regular monthly weeding rounds have been kept up and this clearing is now clean.

Pests and Diseases.

Only one tree was lost during the year and that on account of wind damage.

Manuring.—R-215 manure mixture was forked in between the rows of trees in 2 applications at the rate of 1½ lb. per tree per application.

1946 Clearing — 21 Acres — Nivitigalakele.

Weeding.—This clearing was weeded regularly and is clean.

Pests and Diseases.—7 trees were lost during the year, All of them were blown down by strong winds during the S.W. Monsoon.

Manuring.—R-215 manure mixture was forked in between the rows of trees in 2 applications at the rate of 1 lb. per tree per application.

Supplying Vacancies.—12 stumped buddings of the appropriate clone were planted during the wet weather in place of trees which had died last year and this year.

1945 Clearing — 25 Arres — Hedigalla.

Weeding.—Regular weeding rounds were maintained. This clearing is clean.

Pests and Diseases.

Fomes lignosus caused the death of two trees, Ustulina zonata 2 and sun scorch 1 tree. Damage, which fortunately did not result in deaths, was caused to 44 trees in this clearing.

Manuring.—R-215 manure mixture was forked in between the rows of trees in 2 applications at the rate of 1¼ lb. per tree per application.

1946 Clearing — 16 Acres — Hedigalla.

Weeding.—Regular monthly rounds were done. The clearing is clean.

Pests and Diseases.

The following number of trees were lost during the year:—

Fomes lignosus	...	...	4 trees
Fomes noxius	...	...	1 tree
Wind damage	...	...	4 trees.

Manuring.—R-215 manure mixture was forked in between the rows of trees in 2 applications at the rate of 1 lb. per tree per application.

1947 Clearing — 60 Acres — Hedigalla.

Weeding.—Regular monthly weeding of this clearing was done and the area is clean.

Pests and Diseases.

There were 30 casualties in this clearing. The causes are listed below:—

Fomes Lignosus	...	...	11 trees
Wind Damage	...	...	19 „

Corticium salmonicolor (Pink Disease) infected the top of one tree which was treated according to the recommendations of the Mycological Department.

Supplying.—In the 500-point area 138 stumped TJ.1 seedlings were planted in vacant holes on the recommendations of the Botanical Department.

Manuring.—R-215 manure mixture was forked in between the rows of trees in 2 applications at the rate of ¾ lb. per tree per application.

1949 Clearing — 30 Acres — Hedigalla.

Weeding.—This clearing was weeded monthly and the leguminous cover crops were controlled. The area is clean-

Pests and Diseases.

The cause of the largest number of deaths in this clearing was sun scorch which was responsible for loss of 119 trees. *Fomes lignosus* killed 12 trees and Fomes noxius (brown root) 2 trees. Wind damaged 4 trees which broke at various heights and were attended to.

Supplying.—20 vacancies due to various causes were supplied with budded stumps of the appropriate clone.

Manuring — R-215 manure mixture was forked in round each plant twice during the year at the rate of ½ lb. per tree per application.

1950/51 Clearing — 20 Acres — Hedigalla.

Weeding.—Leguminous cover crops were controlled and this field weeded monthly. The clearing is clean.

Pests and Diseases.

Fomes lignosus caused the deaths of 2 trees and 20 trees were lost due to various causes like die-back due to damaged roots at time of planting.

Supplying.—All vacancies due to deaths in this clearing were replaced with budded stumps of the appropriate clone.

Manuring.—R-215 manure mixture was forked in lightly round each plant in 2 applications at the rate of ¼ lb. per tree per application.

SUSPENSE ACCOUNT.

1952 Clearing — 35 Acres — Dartonfield.

Felling and Clearing.

About 32 acres have been felled mechanically to date and about 30 acres cleared. This work is in progress.

Pests and Diseases.

Areas known to be infected with *Fomes lignosus* are receiving special attention. All infected roots etc. are being grubbed out, stacked and burnt in situ and the infected areas are being isolated by trenches cut round them.

Lining.—This work is in progress. Pegs are being put out at a distance of 9' × 30' on the contour in accordance with the requirements of the Botanical Department, which will be conducting a clone trial in this area.

Holing.—This work is in progress and approximately 6 acres have been completed to date.

Grass and shrubs are being weeded out from the area.

Cover Crops — *Desmodium ovalifolium* cuttings are being planted in the bare patches.

1952 Clearing — 75 Acres — Hedigalla.

Felling, Clearing and Burning.

This work has been completed satisfactorily.

Lining.—The 25 acres to be planted for the Botanical Department experiment has been completed. The balance 50 acres now ready for lining under the guidance of the Agronomy Department, which will be conducting 2 experiments in the area.

Holing.—20 acres have been completed to date. This work is progressing satisfactorily in spite of the shortage of labour.

Grass and Shrubs.—All grass, shrubs and other weeds are being weeded out.

Cover Crops.—*Desmodium ovalifolium* cuttings are being planted whenever the weather is favourable in the areas being cleaned.

***Planting Coffee in 1949 Clearing, Hedigalla — 30 Acres.**

Lining.—This work has been completed.

Holing.—2,500 holes were cut.

Planting.—Robusta coffee seeds obtained from the School of Agriculture, Peradeniya are being germinated in planting baskets filled with suitable soil. 2,500 seedlings of coffee grown in the surrounding villages were procured and planted as an added guarantee that the whole area to be inter-planted with coffee would be completed. *Crotalaria anagyroides* is being planted 3 feet away from the coffee plants on both sides of the rows of plants as temporary shade until Gliricidia maculata cuttins are planted as permanent shade trees.

* The rubber trees in this clearing were planted in 1949 roughly on contours and 9' apart, the rows being 45' apart. It was decided to plant coffee between the rows of rubber trees as an experiment.

REVENUE ACCOUNT.

Seedling Nurseries — 1 Acre — Dartonfield.

This nursery was planted with seedlings from clonal seeds from Kepitigalla Group, Ankumbura. Out of 11,000 seeds received on an order for 10,000 seeds, 9,680 seeds germinated and were planted in the nursery. These seedlings are doing well and have been manured every three months with animal meal manure at the rate of ¼ oz. per seedling per application.

Seedling Nurseries — 6 Acres — Nivitigalakele.

Seeds obtained from budded rubber areas on Dartonfield, Nivitigalakele and Hedigalla Divisions and also seeds purchased from Ellakande and Sorana Estates were germinated and planted in these nurseries. 37,185 seedlings were available after the germination of the seeds.

Budwood Nurseries — ¼ Acre — Dartonfield.

This nursery which was planted with 200 budded stumps of Clone LCB.870 in 1950 has been weeded, manured, etc. at the same time as the 1950 clearing, Dartonfield. Budwood is now being despatched to various estates and small-holdings.

Budwood Nurseries — 6½ Acres — Nivitigalakele.

Provision has been made for additional supplies of authenticated budwood. Budwood of all clones recommended as planting material by the Institute is available. Also budwood of foreign and local clones being tested by the Botanical Department. The nurseries have been weeded and manured regularly.

Food Production.

In Dartonfield about ¼ acre of swampy land was cultivated as a paddy field. In Nivitigalakele ½ acre of similar land was cultivated as a paddy field too. In Hedigalla pineapples, from the plants growing in place of terracing in the 1949 clearing are doing well. Fruits were sold throughout the year to members of the Institute.

FIELD EXPERIMENTS.

Dartonfield.

Labels.—The trees in the 1950 clearing was labelled with metal tags with numbers. Numbers were stencilled on the trees in the 1947 clearing and the metal tags previously used were removed.

Test Tapping.—This was done regularly for the Botanical Department.

Miscellaneous Experiments.—A nursery was established for the Mycological Department out of germinated seeds derived from hand cross pollination of clone LCB.870 with various high yielding clones.

Nivitigalakele.

Labels.—All metal tags were removed where they were still found and the numbers were stencilled on the trees in the Clearings.

Test Tapping was done regularly for the Botanical Department.

Micellaneous Experiments.

Mycological Department.

Artificial Defoliation.—An experiment in artificial defoliation was carried out for the Mycological Department with "Aero Cyanamid" used similarly to sulphur in dusting trees.

Weed Killers.—An area overgrown with grass, shrubs and mikania was used for experimenting with "Cyanamate" and sodium arsenite as weed-killers in various strengths.

Hedigalla.

Labels.—Metal labels with numbers were put on trees in the 1950/51 clearings and replaced where necessary in the other immature areas. Numbers were stencilled on the trees which were large enough for this to be done.

Test Tapping was done regularly for the Botanical Department in the 1943 and 1944 Clearings.

Verifications of Stores and Furniture etc.

This was done in the usual manner by Officers appointed for the purpose.

CAPITAL EXPENDITURE.

Buildings etc.

Intermediate Bungalows.—1 new intermediate bungalow is being built on Dartonfield. The site has been prepared.

Junior Staff Bungalows.—2 new Junior Staff bungalows are being built on Dartonfield and the Hedigalla Conductor's bungalow is being brought up to Junior Staff bungalow standards.

Double Cottages for Labourers.—4 double cottages are being built on Dartonfield and 8 on Hedigalla.

Store and Garages.—2 garages have been constructed on Dartonfield capable of sheltering 4 cars each. A separate chamber away from the factory and laboratories was built for storing explosives and the old garage is being converted into a store room to ease the congestion in the Chemical Department section of the factory. A new garage for the Institute's lorry is nearly complete.

Drying Chambers.—2 small drying chambers are being built at Hedigalla for drying test tapping "biscuits". One has been completed and the other is being built.

Widening Path to Chummery.—A motorable road to the Chummery and through the area to be replanted in 1953 was constructed.

Latrines.—On Dartonfield 3 double water-sealed latrines and 6 single water-sealed latrines were built.

On Nivitigalakele 2 double water-sealed latrines were built.

On Hedigalla 10 double water-sealed latrines were built.

Junior Staff Recreation Club.—This building has been completed. The water supply and electrical fittings are being put in.

Metalling Factory Premises.—Colas was applied to the Factory compound and the result was most satisfactory.

Renovating Budder's Quarters — Nivitigalakele.—This was completed satisfactorily.

Hedigalla Cart Road.—The road up to the end of the 1950/51 clearing was completed and is motorable.

Furniture for Superintendents's Bungalow.—Furniture was purchased to this bungalow which had not been occupied for some time.

Survey of Hedigalla.—This was completed and areas set aside for planting from 1952 to 1955 were demarcated. 3 copies of the plan were obtained from the Surveyor whose estimate for the work was approved by the Experimental Committee of the Rubber Research Board.

Latex Tank for Nivitigalakele.—A new latex settling tank capable of coping with over 400 gallons of latex was constructed on Estate account with in the estimated sum of money provided for the purpose.

Latex Tank for Hedigalla.—A settling tank and coagulating tank were built at Hedigalla for less than the estimated cost.

New Pump House at Dartonfield.—A new house was built for the larger electric motor and pump by the new well.

Additional Water Supply — Dartonfield.—A dam has been built across a small stream and a pipe line laid to a new concrete tank which will supply water for the indoor sanitation scheme of the Junior Staff bungalows. The pipe line has also been laid from this storage tank to the Junior Staff bungalows and Club for the same purpose. Other works under this heading are in progress.

Indoor Sanitation for J.S. Bungalows — Dartonfield.—This work is progressing satisfactorily and should be completed early in 1952.

Water Supply — Hedigalla.—A dam was constructed across a stream with the sanction of the Land Commissioner and pipe lines were laid to the bungalows of the two Experimental Conductors, the Estate K.P.'s Quarters and the curing shed. A pump was also fitted up over a well and a pipe line laid to a 400 gallon concrete tank to supply water to the labourers' cottages. More work in this connection is in progress.

Survey of Dartonfield.—A fresh survey of Dartonfield Division was found to be necessary and sanction was obtained from the Rubber Research Board on the recommendation of the Experimental Committee. This work has been completed and the 2 copies of the plan are awaited from the surveyor.

Refrigerators.—All Senior Staff bungalows have been provided with refrigerators.

Furniture Improvements.—Necessary replacements and repairs were effected on this account.

Maintenance of Buildings.—All necessary repairs were done to the general buildings, bungalows and water and power supply.

Motor Vehicles.—With the sanction of the Rubber Research Board the old Bedford station waggon was sold and a Standard Vanguard estate car was purchased. A commer lorry and a jeep were purchased too.

Labour.

(a) Wage increases were effected in accordance with Government notification as under.

		January & Previously	April Onwards
Males over 16 years	...	1.10	1.30
Females over 15 years	...	1.00	1.20
Childen	...	0.75	0.95

Labour was sufficient and settled. More labour will be necessary on Hedigalla, however, with the progress of the new planting programme there. Details of labour on the check rolls at the end of the year were as follows :—

Dartonfield Group

		Resident	Non-resident	Total
Ceylonese				
Men	...	36	143	179
Women	...	22	69	91
Children	...	6	8	14
Non Ceylonese				
Men	...	33	—	33
Women	...	28	—	28
Children	...	7	—	—
		132	220	352

Health.—The health of the staff and the labour of the Rubber Research Institute has been satisfactory during the year 1951.

Infectious Diseases.—4 cases of mumps, 1 of measles and 3 of chicken-pox occurred during the year. The patients were isolated and treated.

Births.—20 children were born during the year. 7 of these were still born.

Deaths.—2 deaths occurred during the year — 1 due to infantile debility and 1 to pneumonia. Both expired in hospital where they had been sent for treatment.

Hookworm.—Mass treatment was carried out at Hedigalla by the Medical Officer of Health when 76 cases were treated. The Dispenser has successfully treated 78 cases besides these on the whole group.

Anti-Small Pox Vaccination was done to all the members of the staff and labourers who had not been vaccinated within the prescribed period of immunity.

The following is a list of the diseases treated among the Staff and labourers during the year :—

Influenza	... ...	289 cases
Malaria	... ...	9 „
Ulcers	... ...	72 „
Worms	... ...	73 „
Ankylostoma	... ...	43 „
Other Diseases	... ...	716 „
		1,202 „

Annual Holidays with pay were given to all labourers entitled to them in accordance with the wages Board Ordinance.

Maternity Benefits.—Six ordinary and three alternative payments were made under the Maternity Benefits Ordinance.

Dartonfield Group,
Agalawatta.
15th February, 1952.

REPORT OF THE SMALL HOLDINGS PROPAGANDA OFFICER FOR THE YEAR 1951

By

W. I. Pieris

The year has once again been a favourable one for the Rubber owner although the market trend in prices has been downward, from about Rs. 3/- a pound in the early months of the year to about Rs. 1·70 in the latter months, and not upward as in 1950. These prices, however, have been sufficiently attractive to induce owners to want to plant more land under Rubber as well as improve their existing plantations and the advisory services of the Smallholdings Department have been in great demand.

Staff.

The staff remained at its normal strength of 3 Assistant Propaganda Officers, 4 District Field Officers, 31 Rubber Instructors and 4 Clerks.

The following officers left during the year :—

Mr. W. A. C. de Silva, Rubber Instructor Meegahatenna, at end of April.
Mr. M. P. L. Cooray, Rubber Instructor Nivitigala, at end of August.
Mr. D. S. Handunge, Rubber Instructor Undugoda, at end of December.
Mr. N. H. H. Liyanage, Accounts Clerk, at end of November.

The following new appointments were made and the officers assigned to their ranges after the preliminary course of training :—

Mr. Chandra de Silva, Rubber Instructor Matugama, from 1st May.
Mr. D. A Welatantiry, Rubber Instructor Dehiowita, from 1st May.
Mr. D. J. Ratnayake, Rubber Instructor Kegalle, from 1st May
Mr. A. B. Jayasundera, Accounts Clerk, from 1st January 1952.

Loans were given by the Board to two Rubber Instructors for purchasing motor cycles.

Latex Centres.

Instructions were received from the Board to organise a scheme on co-operative lines to supply smallholders' latex in the Kalutara district to the Dunlop Latex Corporation of Ceylon, whose factory was established at Katukurunda during the year. The terms on which the Corporation was prepared to purchase smallholders' latex were explained in a leaflet in Sinhalese and circulated to smallholders by the field staff. Latex from smallholdings was to be brought to convenient "centres", measured, bulked and delivered to the Corporation's lorry which would call at each centre daily. Every pound of dry rubber in the latex would receive payment at 2 cents below the top market price of sheet for the day. Bulking and collecting tanks would be supplied free by the Corporation but a nominal charge would be made for transport. After considerable propaganda, and opposition from Rubber dealers, smallholders, who were at first inclined to be sceptical, were induced to try the scheme on an experimental scale at one centre and, after this had worked satisfactorily for some time, a total of eleven centres, each supplying 20-100 gallons of latex a day, were formed during the latter part of the year. Under the close supervision of the field staff, the scheme is working very satisfactorily and giving to member smallholders a considerably larger profit than before, while saving much time and labour in individual sheet manufacture. The members of each centre have applied for registration as Latex Co-operative Societies, which will ensure the regular checking of accounts by the Co-operative Department.

Weekly advances are remitted by the Corporation to each centre in proportion to the latex supplied and full payment is made at the end of the month.

The successful organisation of the scheme entailed persistent hard work on the part of the Kalutara field staff and reflects much credit on them. The scheme, if expanded to take in smallholders' latex on a wider scale, would be a boon to them and would considerably increase their normal profits.

Replanting.

In the writer's report for 1950 attention was drawn to the fact that the extent of replanting done by smallholders in Ceylon was very poor and that some form of Government assistance was necessary if any real progress was to be made. It was, therefore, gratifying to learn from the Rubber Controller in 1951 that Government was considering a 'Replanting Subsidy Scheme' to encourage the replantng of uneconomic Rubber lands with high yielding material. It was agreed by the Board that the work should be carried out under the supervision of the Smallholdings Department. The scheme in broad outline is to pay, in instalments as work progresses, a grant of Rs. 750/- per acre to owners of less than 100 acres of Rubber who replant their uneconomic Rubber lands. No single owner will receive grants for less than 1 acre or more than 50 acres. Funds for the scheme, the extra supervisory staff required, and the opening of nurseries for providing suitable planting material will be supplied by Government. Estimates of the probable cost of the scheme were prepared.

The distribution of uneconomic Rubber lands of less than 100 acres in the "Rubber Districts" was estimated by the Rubber Commissioners in 1947 as follows :—

District	Uneconomic Area
Colombo	5,075 acres
Kalutara	8,308 „
Galle	5,383 „
Matara	7.795 „
Ratnapura	4,636 „
Kegalla	11,487 „
Kurunegala	2,632 „
Total ...	45,316 „

The scheme is understood to be before the Ministry of Agriculture for ratification.

Replanting was completed on 75 out of the 87 Government Rubber Allotments at Urumiwela. All soil conservation and planting operations were throughout supervised by the local field staff and a total of 14,500 clonal seedlings were supplied from the smallholders' nurseries at Walpita. The first allotments were planted on July 10th in the presence of the A.G.A. Kegalla and the writer in ideal weather. 4 ozs. of Saphos phosphate for each planting hole and cover crop seeds were supplied to allottees on the writer's advice. All plants have made very satisfactory growth up to the time of writing. The following is an extract from a letter dated 29.6.51„ copied to the writer, from the A.G.A. Kegalla to the Land Commissioner. "The S.H.P.O. and his officers of the Rubber Research Institute have given me every assistance in carrying out this work and am very grateful to them for their ready co-operation."

Replanting work under the directions of Rubber Instructors was completed on 103 smallholdings comprising 126 acres.

Replanting permits issued by the Rubber Controller during the year were as follows :—

	Permits Issued	Extent
Estates (over 10 acres) ...	227	6,024 acres
Smallholdings (1—10 acres) ...	96	160 „
	323	6,184 acres

New Planting.

The demand for new-planting permits continued to be on the increase and 4,213 middle and peasant-class permits covering 6,526 acres were issued during the year as against 2,023 permits covering 3,478 acres in 1950. 32 permits were cancelled. 5,087 inspection reports were sent to the Rubber Controller on the suitability of lands for planting Rubber, after each had been visited by a Rubber Instructor.

The Rubber Controller now informs this Department as soon as a middle or peasant-class permit is issued and a Rubber Instructor visits the land and gives necessary advice within 2 weeks, before incorrect methods can be adopted. Further visits follow, in the course of which lining for soil conservation and holing is carried out, and advice is given at every stage until the holding is satisfactorily planted. 14,407 advisory visits to new-planting holdings were made by Instructors. The extent of actual work done on holdings appears under other headings such as "Soil Conservation, Planting Material" etc.

Following the census of N.R.P.S. holdings completed in 1950, Instructors continued to visit them. Each visit is recorded at the back of the relevant census form with a summary of the existing conditions at time of visit and the advice given. Special attention was devoted to holdings coming into tapping, where the tapping cuts are marked by the Instructor. The majority of owners are tapping their new holdings with greater care but a few of them are still resorting to daily tapping which is ruinous to budded rubber. It was arranged with the Rubber Controller to send letters of warning to permit-holders who persisted in mismanaging their holdings in spite of repeated advice by Instructors.

Assistance was given to the Divisional Agricultural Officers concerned in opening up model demonstration blocks of budded rubber at the Govt. farms at Kundasale, Karapincha (near Ratnapura) and Labuduwa. It is intended to crown-bud a portion of the plants with the oidium-resistant clone LCB.870 as a trial.

Planting Material.

The policy of this Department regarding the supply of planting material has been hazy in the past and was placed before the Board for clarification. It was pointed out that although the provision of such material was not normally the function of a research and advisory Institution, in Ceylon there was no other organisation from which small owners could obtain reliable material. The laying down of extensive nurseries for providing suitable plants, their management, distribution of material and collection of payment would entail considerable work on both the field and office staff, but in view of the importance of the matter, the Board decided that all available clonal seed and as many ordinary seedlings as possible, to be budded and issued as budded stumps, should be established in nurseries. This material is to be primarily issued to "smallholders", and any surfeit to middle-class owners. Arrangements were also made for the Rubber Controller to notify the writer well in advance, of the probable requirements of planting material for smallholders, from the permits issued by him. Middle-class planters will be expected to provide their own nurseries for which budwood and budders can be provided by the Department.

The demand for planting material in 1951 was well in excess of available supplies, which were issued as follows:—

Clonal Seedlings.

	Free Issues	Sales	Total
Walpita Farm ...	14,632	15,755*	30,387
Egaloya Farm ...	19,434	5,127	24,561
Horana Farm ...	742	954	1,696
Nivitigalakele ...	13,712	6,909	20,621
Demonstration Nurseries	303	—	303
	48,823	28,745	77,568

* Includes 14,500 issued to Urumiwela.

The demand for clonal seedlings, however, exceeded 98,000.

A total of 6,925 budded stumps was also sold, mainly from the smallholders' nursery at Nivitigalakele. These are sold at special rates, namely @ 25 cents to owners of less than 5 acres of Rubber and @ 35 cents to other small owners. 639 yards of budwood were issued for budding nurseries for the supply of budded stumps to the smallholders. 280 yards were sold, and 98 yards issued free to bud plants in 5 peasant-class holdings.

Owing to the large number of permits issued in 1951, even a larger demand for plants is anticipated in 1952 and the poor seed season this year was, therefore, all the more unfortunate. Germinations from 107,600 clonal seed collected from all available sources (and including 18,000 seed purchased) only amounted to 12,647, which is exceptionally poor. This is due to a high percentage of infertile seed caused by unfavourable weather during the fertilisation season. As this number would be quite inadequate to meet 1952 demands, prompt measures were taken to establish nurseries of ordinary seed at Nivitigalakele for issue as budded stumps in October-December 1952. Germinations were again poor, but 78,000 plants have been obtained after laying down 217,000 seed, and these will form the principal source of supply for next year.

Owing to the anticipated shortage of material, permit-holders were also warned by a press notice to establish their own private nurseries wherever possible, which could be budded next year with Departmental budwood.

Overgrown portions of the budwood nurseries at Egaloya and Eramini golla Farms were pollarded so that fresh, succulent budwood may be available for future requirements.

300 budded stumps of the oidium-resistant clone LCB.870 were issued free to 6 smallholders in oidium areas on trial.

Sheet Improvement.

Although any large-scale improvement in the quality of smallholders' sheet must be effected through co-operative rather than individual effort, due attention was given by Instructors to conducting sheet-making demonstrations, building standard-type smallholders' smokehouses, facilitating the supply of good acid, mesh, pans etc. to smallholders and by the issue of "Quality Certificates" to those who made good sheet. 670 sheet-making demonstrations were given, and 739 aluminium latex pans, 880 sq. ft. of brass mesh for strainers and 739 bottles of acid of guaranted strength were sold. 165 locally made wooden latex pans were issued free. 31 Quality Certificates were awarded. 451 samples of acid were tested. 9 new spiral rollers and 6 smooth rollers were procured for Rubber Co-operative Societies and individual smallholders from Colombo firms.

As a good many small owners still smoke their sheet in kitchens, the construction of properly-designed, cheap smokehouses was encouraged. 46 demonstration and 133 private smokehouses were completed and 129 existing houses improved.

Co-Operative Work.

The question of who is to provide the initial loans necessary for sheet co-operative societies for putting up smokehouses and buying rollers etc has unfortunately not been settled yet and this has been a serious drawback in forming new societies. The Aruppola Co-operative Society completed the building of its smokehouse and coagulating shed and purchased 2 rollers with its own funds. It was "registered" by the Co-operative Department, has started co-operative sheet manufacture and is making good sheet. The Societies at Hataraliadde, Kahagalla, Ittapana, Dediyagala, and Maliduwa continued to function satisfactorily, although the two latter have not applied for registration. There is still some delay on the part of the Co-operative Department in registering these societies and the Registrar was duly communicated with. The Dapiligoda Society found it easier and more profitable to supply latex to the Latex Corporation and ceased to make sheet, inspite of the fact that its nett profit for the first year

from sheet manufacture was Rs. 4,897·77. The field staff in the areas concerned have been in constant attendance on all Societies and guided every stage of their work. The spiral roller formerly loaned to the Dapiligoda Society was issued to a band of rubber colonists at Dambulla for co-operative use.

Soil Conservation.

Rs. 7,942·17 was paid to 151 peasant permit-holders as soil conservation grants as against Rs. 5,191·12 to 75 during the previous year. The increase is mainly due to the large number of new permits being issued. The work on each holding was checked and a detailed report submitted before payment was made.

Instructors lined for contour drains or stone terraces 1,661 acres on 1,350 N.R.P.S. holdings, 131 acres on 109 replanting holdings and 76 acres on 40 mature areas.

4 field officers attended a course in soil conservation at Peradeniya by the Soil Conservation Officer of the Department of Agriculture in January.

Assistance to Other Departments.

Calls for assistance on matters pertaining to Rubber from other Government Departments which have no trained field staff of their own were on the increase. Although these were at times not strictly within the purview of this Department, all possible help was rendered. The Rubber Controller requested the services of Rubber Instructors for checking areas new-planted under capitalist-class permits and the terms on which this work could be undertaken were forwarded. Yield assessments of Crown Rubber Allotments in the Matara and Kamburupitiya areas were sent to the A.G.A. Matara from time to time for purposes of leasing them. A report was forwarded to the G.A. Kurunegala on the co-operative management of the Arampola Government Rubber Allotments. The A.G.A. Kalutara was informed of the Boards decision that, according to a previous ruling by the Minister of Agriculture, Rubber Instructors would continue to visit and advise the Kalutara Rubber colonists but that further duties could not be undertaken. The D.R.O. Gampola was advised regarding the construction of a smokehouse etc. for the co-operative management of the Nillambe Rubber Settlement.

Visits, Demonstrations, Compost-Pits.

In addition to the visits and demonstrations mentioned under previous headings, 5,714 advisory visits were made by Instructors to mature holdings, 8,125 to smallholders' smokehouses, 1,100 to replanted areas and 583 to Latex Centres.

552 Tapping, 81 disease control, 18 budding and 535 other demonstrations were given.

117 demonstration and 94 private compost-pits were opened.

Correspondence.

Correspondence as usual was heavy.

General :	Inward	3,228
	Outward	2,264
With Rubber Controller :		
	Inward	3,271
	Outward	5,313 (including Preliminary Reports)

General.

Instructors' Ranges were visited by the writer periodically and were closely supervised by the two Asst. Propaganda Officers and four District Field Officers in charge. All new Instructors recruited during the year were given a course of lectures by the writer and practical training in budding, tapping, road-tracing etc. at Nivitigalakele before they were sent to their ranges.

Service was rendered as a member of the Rubber Sub-Committee for the Colombo Plan Exhibition and arrangements were made for various models etc. representing Rubber smallholdings' work to be made by Rubber Instructors for the Exhibition.

A memorandum was submitted to the Board regarding the terms of service of the Senior Staff.

Office of the Smallholdings Propaganda Officer,
Eastern Bank Building, P.O. Box 901, Colombo.
14th February, 1952.

AUDITOR GENERAL'S REPORT FOR 1950

No. R.R.S.
Audit Office,
Colombo, 23rd August, 1951.

The Actg. Chairman,
Board of Management,
Rubber Research Scheme,
Agalawatta.

The accounts of the Rubber Research Scheme, (Ceylon), Agalawatta for the year ended December 31st, 1950 were audited under my direction. The financial statements :—

(a) Dartonfield Estate Working Account ;
(b) Nivitigalakele Experiment Station Working Account ;
(c) Hedigalla Estate Working Account ;
(d) Revenue Account, Capital Account and General Balance sheet ; and
(e) Provident Fund Working Account,

were compared with the books and accounts and found to agree. The Statements are returned herewith, duly certified.

I. Income.

2. The actual income for the year amounted to Rs. 1,881,724.39, and this sum included a sum of Rs. 31,996.31 being a portion of cess collections for the year 1949 received in 1950.

It exceeded the estimate by Rs. 816, 183.39.

3. A comparison between the approved estimates and the actual income under the different accounts is shown in the Statement "A" attached.The reasons for the variations between the estimates and the actual income as furnished by the Director are shown against the respective items in the statement — The working accounts of the Experiment Stations and Estates showed large profits during the year mainly as a result of unexpected increase in rubber prices.

4. **Profit from Dartonfield Estate.**—The profit for the year under review was Rs. 69,432.92 as compared with Rs. 20.924.21 in the previous year. It exceeded the estimated profit by Rs. 65,527.92.

5. **Profit from Nivitigalakele Experiment Station.**—The working of this experiment station for the year showed a profit of Rs. 110,686. 29 as compared with Rs. 23,825.52 in the previous year. It exceeded the estimated profit by Rs. 99,272.29.

6. **Profit from Hedigalla Estate.**—The profit for the year amounted to Rs. 3,002.27 whereas the estimated loss of income in working this estate was Rs. 942/-.

II. Expenditure.

7. **Revenue Expenditure.**—The total expenditure on revenue account exclusive of the amount allowed for depreciation of fixed assets and Audit Fee Reserve amounted to Rs. 602,974.48 as compared with Rs. 597,323.97 for the previous year. The details of this expenditure are fully set forth in the Revenue Account. The whole of this expenditure was checked with supporting vouchers and accounts.

8. **Capital Expenditure.**—The expenditure incurred on fixed Capital Assets during the year amounted to Rs. 89,096.98 as compared with Rs. 11,078.34 for the previous year. The details of this expenditure are shown in the Capital Account.

9. A comparison between the approved estimates and the expenditure incurred during the year is shown in statement 'B' attached. The reasons for the major variations between the estimates and the acctual expenditure as furnished by the Director are shown against the respective items in the Statement.

10. **Unauthorised Excesses.**—(a) Under Revenue Expenditure there have been excesses on 14 items aggregating Rs. 18,430.89.

(b) Under Capital Expenditure the provision has been exceeded on 3 items by a total sum of Rs. 5,232.01 and an expenditure of Rs. 1,775.30 has been incurred on a new item viz. Oil Renovator for Dartonfield Factory for which no provision had been made.

Covering sanction will have to be obtained for these excesses and the unauthorised expenditure.

III. Capital Account.

11. The total expenditure on Capital Account at 31-12-1949 was Rs. 1,297,468.32. During the year under review capital expenditure amounted to Rs. 89,096.98 thus bringing the total capital cost up to Rs. 1,386,565.30 at 31-12-1950.

IV. Balance Sheet.

12. (a) **Liabilities :—**

Creditors — Rs. 19,070.31.—This amount represents (a) the sums amounting to Rs. 13,656.33 due to creditors for goods purchased or services rendered during the year (out of which a sum of Rs. 226/- has not yet been paid).

(b) Rs. 1,573.02 being a portion of the amount received in advance from Government for soil conservation work.

(c) A sum of Rs. 210/- paid in advance for subscriptions for 1951 publications, and

(d) A sum of Rs. 3,630.96 incurred by the London Advisory Committee for services rendered.

13. **Passage Fund Reserve — Rs. 34,276.64 :—**

The balance on 31st December, 1950 was Rs. 30,745.86 and a sum of Rs. 5,000/- was transferred to this fund during the year. A sum of Rs. 1,469.22 was utilised during the year in connection with the Sea and Air passages of the members of the Senior Staff. This reduced the total to the credit of the Fund to Rs. 34,276.64.

14. **Depreciation Reserve Rs. 291,234.05 :—**

This amount represents the amount set apart for the depreciation of the fixed assets of the Scheme. The amount transferred from Revenue to this account during the year was Rs. 31,930.42 made up as follows :—

	Rs. cts.	Rs. cts.
Dartonfield.		
Buildings at 3½% on Rs. 286,820.93 ...	10,038.73	
Furniture and Fixed Equipment at 7½% on Rs. 33,761,39 ...	2,532.10	
Water & Power Supply at 7½% on Rs. 49,577.73	3,718.33	
Accumulators and Station Waggon at 20% on Rs. 19,763.17 ...	3,952.63	
Machinery and Tools at 7½% on Rs. 85,179.86	6,388.49	
Nivitigalakele.		
Buildings at 3½% on Rs. 45,784.33	1,602.45	
Furniture and Fixed Equipment at 7½% on Rs. 2,269.44 ...	170.21	
Water and Power Supply at 7½% on Rs. 2,267,57	170.07	
Machinery and Tools at 7½% on Rs. 3,590.78	269.31	
Hedigalla.		
Buildings at 3½% on Rs. 59,154.59 ...	2,070.41	
Furniture and Fixed Equipment at 7½% on Rs. 1,528.26 ...	114.62	
Water and Power Supply at 7½% on Rs. 781.72	58.64	
Laboratory Apparatus at 7½% on Rs. 11,259.11	844.43	31,930.42

15. **Provident Fund Reserve — Rs. 207.073.22.**

The balance to the credit of the Fund at the end of 1949 was Rs. 163,013.68 and additions during the year under review amounted to Rs. 66,390.65. A sum of Rs. 22,331.11 was paid out to officers who retired during the year. This reduced the total to the credit of the Fund to Rs. 207.073.22.

16. **Medical Fund — Rs. 13,410.37.**

The balance to the credit of this Fund at the end of 1949 was Rs. 12,493.71 and additions during the year under review amounted to Rs. 5,083.60. A sum of Rs. 4,166.94 was paid out to the officers during the year.

17. **Audit Fee Reserve — Rs. 2,243.07.**

The amount to the credit of this account at the beginning of the year was Rs. 1,043.07 and the amount provided for the year 1950 was Rs. 1,200/-. This increased the total to the credit of the Fund to Rs. 2,243.07, as there were no payments during the year.

18. **Reserve for Stabilisation of Income — Rs. 191,798.54.**

No additions to this reserve were made during the year.

19. **Appreciation of Investments — Rs. 26,750.25.**

Represents the amount by which the investments had appreciated in value as at 31.12.1950.

20. **Surplus Account — Rs. 1,797,523.93.**

The balance to the credit of the account at the beginning of the year was Rs. 641.001.42. To this, a sum of Rs. 1,245,619.49 has been added as excess of income over expenditure, and a sum of Rs. 89,096.98 has been deducted from the total, being the contribution to Capital Outlay during the year, leaving a sum of Rs. 1,797,523.93.

21. (b) **Assets — Debtors, Rs. 325,720.31.**

This represents :—

(a) Cess Collections at Colombo for -December, 1950 amounting to Rs. 132,242.36.

(b) Cess collections from ports other than Colombo for the period January to December, 1950 amounting to Rs. 79,152.16, and

(c) Sundry Revenue amounting to Rs. 114,325.79 which were outstanding at 31 December, 1950

Rs. 211,394.52 representing cess collections have been received in full. In regard to the Sundry Revenue all amounts except for Rs. 593.88 have been recovered up to 8.5.1951.

22. **Advance Accounts — Rs. 6,344.53.**

Of this amount Rs. 267.72 and Rs. 5,916.81 represent advances to the Superintendent of Dartonfield, Nivitigalakele and Hedigalla Estates and Smallholdings Propaganda Officer respectively. The amounts shown are the balances with them at 31.12.1950. The amount of Rs, 160/- shown against the Post Master-General represents the sum deposited with him in respect of trunk calls and telephone services.

23. **Accrued Interest on Investments — Rs. 11,904.55.**

This sum represents the amount of interest accrued for the year on the investments, but not received during the year. Only a sum of Rs. 10,285.29 has been recovered up-to 8.5.1951 and the balance sum of Rs. 1,619.26 is still due.

24. **Payments in Advance — Rs. 3.750.72.**

This represents certain expenditure incurred in 1950 in respect of the year 1951.

25. **Stocks — Rs. 4,899.26.**—The balance of the Estate Stocks at the end of the year was made up as follows :—

Dartonfield — Rice and Foodstuffs	...	Rs. 4,727.15
Nivitigalakele do	...	Rs. 172.11
		Rs. 4,899.26

The amount represents the value of stock according to the book balances on 31.12.1950.

26. **Loan to Kahagalla Rubber Co-operative Society — Rs. 200/-.**

This loan was paid in October, 1950, repayable in twelve instalments with interest due thereon at 2½% with the Board's approval. (The balance loan of Rs. 700/- due from Hataraliyadde Co-operative Society was paid in full in September, 1950).

27. **Loans to Officers — Rs. 25,485.84.**

This represents the total amount outstanding on 31.12.1950 from officers to whom loans were granted for the purchase of means of transport.

28. **Investments — Rs. 1,974,900.25.**

Details of the investments are shown in the Balance Sheet at Middle Market Value at 31.12.1950. The certificates in support of the Investments were seen.

29. **Cash Balances — Rs. 230,174.92.**

Details of this figure are shown in the Balance Sheet. The Pass Books in respect of the Saving Bank Accounts were seen. The balances in current account Nos. 1 and 2 were verified by reference to Bank Certificates and reconciliation statements. The balance of cash in hand at 31st December, 1950 was not verified, but a surprise verification of the Cash in Hand was made on 9.5.1951.

V. General.

The accounts were received quarterly and audited in this office. The office of the Scheme at Dartonfield Estate was visited once in respect of the accounts of the year under review and the books and accounts kept were checked and cash in hand verified.

Sgd. P. W. KAULE,
for Auditor General.

DARTONFIELD ESTATE

Dr. **WORKING ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1950** **Cr.**

		Rs. Cts.	Rs. Cts.		Rs. Cts.
To	EXPENDITURE :—			By SALE OF PRODUCE :—	
	General Charges	21,704.27		Manufactured Rubber (54,591 lbs.)	94,880.43
	Upkeep, Manufacture & Distribution	18,365.48	40,069.75	Creamed Latex (883.2 gals. 5001.9 lbs. dry rubber)	14,753.78
,,	Loss on Carting Account		131.54		
,,	Balance being Excess of Income over Expenditure transferred to Revenue Account		69,432.92		
			109,634.21		109,634.21

NIVITIGALAKELE EXPERIMENT STATION

Dr. **WORKING ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1950** **Cr.**

		Rs. Cts.	Rs. Cts.		Rs. Cts.
To	EXPENDITURE :—			By SALE OF PRODUCE :—	
	General Charges	11,577.31		Manufactured Rubber (62,255 lbs	105,380.74
	Upkeep, Manufacture & Distribution	14,149.39	25,726.70	Creamed Latex (1757.9 gals. 10,189.78 lbs. dry Rubber)	30,302.28
,,	Upkeep of Nurseries		2,388.98	Planting Material	8,366.90
,,	Handling & Distribution of Budwood and Budded Stumps		5,237.90		
,,	Harvesting of Food Crops Rs. 29.24 *Less* Value of Paddy Harvested ,, 19.19		10.05		
,,	Balance being Excess of Income over Expenditure transferred to Revenue Account		110,686.29		
			144,049.92		144,049.92

HEDIGALLA ESTATE

Dr. **WORKING ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1950** **Cr.**

	Rs. Cts.	Rs. Cts.		Rs. Cts.
To Expenditure :—			By Sale of Produce :—	
General Charges	208.78		Manufactured Rubber (1,200 lbs.)	2,860.68
Upkeep, Manufacture and Distribution	563.84	772.62	Pineapples (6,580 fruits)	994.00
,, Harvesting of Food Crops		79.79		
,, Balance being Excess of Income over Expenditure transferred to Revenue Account		3,002.27		
		3,854.68		3,854.68

RUBBER RESEARCH SCHEME (CEYLON)

Dr. **REVENUE ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1950** **Cr.**

	Rs. Cts.	Rs. Cts.		Rs. Cts.	Rs. Cts.
To Personal Emoluments :—			By Balances of Estates Working Accounts :—		
Senior Scientific Staff	107,689.42		Dartonfield	69,432.92	
Junior Scientific Staff	21,236.13		Nivitigalakele	110,686.29	
Office Staff	23,414.25	152,339.80	Hedigalla	3,002.27	183,121.48
To Library & Publications :—			,, Cess Collections		1,491,307.60
Library	5,776.05		,, Interest		38,230.27
Publications	1,924.37	7,700.42	,, Sale of Publications		1,049.32
To Smallholdings Work :—			,, Sundry Receipts		3,451.72
Salaries & Allowances	147,764.13		,, Government Grant for Smallholdings Work		164,564.00
Travelling & General Expenses	52,465.88	200,230.01			
To Laboratory :—					
Equipment & Working Expenses	5,779.93				
Furniture Replacements	65.71	5,845.64			
Carried over		366,115.87	Carried over		1,881,724.39

RUBBER RESEARCH SCHEME (CEYLON)

Dr. **REVENUE ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1950** – *(Contd.)* **Cr.**

		Rs. Cts.	Rs. Cts.		Rs. Cts.
	Brought forward		366,115.87	Brought forward	1,881,724.39
To	Field & Factory Experiments :—				
	Field Experiments	3,862.97			
	Factory Experiments	486.85	4,349.82		
To	Office :—				
	Stationery & Office Equipment	1,714.14			
	Postages & Telegrams	1,850.52			
	Advertising	1,403.34			
	Telephones	1,266.80			
	Audit	1,200.00	7,434.80		
To	Travelling :—				
	Expenses of Board Members	3,261.31			
	Expenses of Staff	14,504.29	17,765.60		
To	Maintenance of Buildings, Power and Water Supply & Station Waggon :—				
	General Buildings	194.10			
	Bungalows	11,005.11			
	Power & Water Supply	4,729.60			
	Bungalow Furniture Replacements	396.94			
	Station Waggon	3,227.11	19,552.86		
To	Miscellaneous Items shared with Estates:—				
	Dartonfield General Charges	27,130.26			
	Nivitigalakele ,, ,,	12,863.70			
	Hedigalla ,, ,,	10,228.68			
	Upkeep of Roads & Grounds	1,004.88			
	Factory Upkeep	3,509.99			
	Power Supply	11,922.41	66,659.92		
	Carried over		481,878.87	Carried over	1,881,724.39

RUBBER RESEARCH SCHEME (CEYLON)

Dr. **REVENUE ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1950**—*(Contd.)* **Cr.**

		Rs. Cts.	Rs. Cts.		Rs. Cts.	Rs. Cts.
	Brought forward		481,878.87	Brought forward		1,881,724.39
To	CONTINGENCIES :—					
	Contribution to London Advisory Committee	26,713.29				
	General Charges	1,121.66				
	Insurances	5,109.70				
	Staff Provident Fund	42,257.96				
	Passages	5,000.00				
	Entertainment Allowance	492.00				
	War Allowance to Staff	39,078.00				
	Contribution to Medical Fund	2,523.00	122,295.61			
To	DEPRECIATION		31,930.42			
To	Balance, being Excess of Income over Expenditure for the year carried forward to Balance Sheet		1,245,619.49			
			1,881,724.39			1,881,724.39

RUBBER RESEARCH SCHEME (CEYLON)

CAPITAL ACCOUNT AS AT 31st DECEMBER, 1950

EXPENDITURE

	To December 31st. 1949 Rs.	Transfers between A/cs. Rs.	Additions in 1950 Rs.	Total Rs.
To LAND INCLUDING DEVELOPMENT –				
Dartonfield	137,803.11		14,132.99	151,936.10
Nivitigalakele	155,204.69		2,313.92	157,518.61
Hedigalla	147,028.30		18,125.11	165,153.41
To BUILDINGS AND LINES				
DARTONFIELD :—				
Estate	94,367.62		——	94,367.62
Headquarters	290,552.11		19,220.26	309,772.37
NIVITIGALAKELE :—				
Estate	40,256.01		——	40,256.01
Headquarters	21,993.03		——	21,993.03
HEDIGALLA :—				
Estate	44,936.53		——	44,936.53
Headquarters	18,628.62		——	18,628.62
To FURNITURE AND FIXED EQUIPMENT :—				
Dartonfield	60,885.08		——	60,885.08
Nivitigalakele	5,733.70		——	5,733.70
Hedigalla	1,764.25		——	1,764.25
To POWER AND WATER SUPPLY :—				
Dartonfield	89,968.47		8,337.53	98,306.00
Nivitigalakele	5,128.09		——	5,128.09
Hedigalla	879.70		——	879.70
To MACHINERY AND TOOLS :—				
Dartonfield	136,818.92		2,155.30	138,974.22
Nivitigalakele	4,754.23		——	4,754.23
Laboratory Apparatus	29,432.52		24,811.87	54,244.39
London Plant	11,333.34		——	11,333.34
	1,297,468.32		89,096.98	1,386,565.30

RECEIPTS

	Rs. Cts.	Rs. Cts.
By REVENUE APPLIED FOR CAPITAL PURPOSES :—		
At 31st December, 1949	1,297,468.32	
In 1950	89,096.98	1,386,565.30
	——	1,386,565.30

RUBBER RESEARCH SCHEME (CEYLON)

GENERAL BALANCE SHEET AS AT 31st DECEMBER, 1950

LIABILITIES

	Rs. Cts.	Rs. Cts.
CREDITORS :—		
Sundries	13,656.33	
Government Grant for Soil, Conservation Work received in advance	1,573.02	
Subscriptions for 1951 Publications received in advance	210.00	
London Advisory Committee Advance A/c.	3,630.96	19,070.31
PASSAGE FUND RESERVE :—		
At December 31, 1949	30,745.86	
Additions during 1950	5,000.00	
	35,745.86	
Less Payments in 1950	1,469.22	34,276.64
DEPRECIATION RESERVE :—		
At December 31, 1949	259,303.63	
Add Reserve for 1950	31,930.42	291,234.05
PROVIDENT FUND RESERVE :—		
At December 31, 1949	163,013.68	
Additions during 1950	66,390.65	
	229,404.33	
Less Payments in 1950	22,331.11	207,073.22
MEDICAL FUND :—		
At December 31, 1949	12,493.71	
Additions during 1950	5,083.60	
	17,577.31	
Less Payments in 1950	4,166.94	13,410.37
AUDIT FEE RESERVE :—		
At December 31, 1949	1,043.07	
Add Reserve for 1950	1,200.00	2,243.07
Carried over		567,307.66

ASSETS

	Rs. Cts.	Rs. Cts.
DEBTORS :—		
Cess Collections for December 1950	211,394.52	
Sundries	114,325.79	325,720.31
ADVANCE ACCOUNTS :—		
ESTATE SUPERINTENDENT:		
Dartonfield Rs. 38.48		
Nivitigalakele ,, 96.01		
Hedigalla ,, 133.23	267.72	
SMALLHOLDINGS PROPAGANDA OFFICER :—		
General Account ,, 5,291.56		
Soil Conservation A/c. ,, 625.25	5,916.81	
Postmaster General	160.00	6,344.53
ACCRUED INTEREST ON INVESTMENTS		11,904.55
PAYMENTS IN ADVANCE		3,750.72
STOCKS :—		
Estate Stocks		4,899.26
LOAN TO KAHAGALLA RUBBER CO-OPERATIVE SOCIETY :—		
At 31st December, 1950		200.00
LOANS TO OFFICERS :		25,485.84
Carried over		378,305.21

RUBBER RESEARCH SCHEME (CEYLON)

GENERAL BALANCE SHEET AS AT 31st DECEMBER, 1950—(*Contd.*)

LIABILITIES	Rs. Cts.	Rs. Cts.
Brought forward		567,307.66
RESERVE FOR STABILISATION OF INCOME :—		
At December 31, 1949		191,798.54
APPRECIATION ON INVESTMENTS :		26,750.25
SURPLUS ACCOUNT :—		
At December 31, 1949	641,001.42	
Add Excess of Income over Expenditure for 1950	1,245,619.49	
	1,886,620.91	
Less Contribution to Capital Outlay	89,096.98	1,797,523.93
		2,583,380.38

ASSETS	Face Value	Middle Market Value at 31-12-50
INVESTMENTS :—	Rs. Cts.	Rs. Cts.
Brought forward		378,305.21
In Ceylon Government 3½% Loan 1957/62	25,000.00	26,250.00
In Ceylon Government 3% War Loan 1956/60	20,000.00	20,800.00
In Ceylon Government 3¼% Home Defence Loan 1952	35,000.00	35,875.00
In Ceylon Government 3¼% Home Defence Loan 1953	30,000.00	30,975.00
In Ceylon Government 3½% National Loan 1964/69	70,000.00	74,375.00
In Ceylon Government 3¼% National Loan 1956	100,000.00	105,500.00
In Ceylon Government 3 % National Loan 1954	5,000.00	5,243.75
In Ceylon Government 3 % Defence Loan @ par	15,000.00	15,000.00
In Ceylon Government 3 % Sri Lanka Loan 1969/74	750,000.00	757,500.00
In Ceylon Government 3 % Loan 1966/76	500,000.00	501,250.00
Ceylon State Mortgage Bank 3¼% Debentures	398,150.00	402,131.50
	1,948,150.00	
CASH BALANCES :—		
At Ceylon Savings Bank		3,938.79
On Savings Deposit (Bank of Ceylon)		8,810.88
In Current Account No. 1		212,030.76
In Current Account No. 2		5,273.60
In hand		120.89
		2,583,380.38

The Accounts of the Rubber Research Scheme above set forth have been audited under my direction. I have obtained all the infromation and explanations that I have required and I certify as a result of this audit that, in my opinion, the Balance Sheet is properly drawn up so as to exhibit a correct view of the state of affairs of the Scheme as at 31st December, 1950.

Audit Office,
Colombo 7. 23rd August, 1951.

(Sgd.) P. W. KAULE,
for Auditor-General.

PROVIDENT FUND

Dr. **WORKING ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1950** **Cr.**

	Rs. Cts.	Rs. Cts.		Rs. Cts.	Rs. Cts.
To Payment to 22 Retiring Officers		22,331.11	By Balance brought forward from 1949		163,013.68
,, Balance carried forward to 1951		207,073.22	,, Board's Bonus for 1950	34,605.97	
			,, Interest on Officers' Contributions	2,926.39	
			,, Interest on Board's Bonus Account	3,714.56	41,246.92
			,, Bonus paid to 10 Retiring Officers		710.24
			,, Interest for 1950 paid to 16 Retiring Officers		300.80
			.. Members' Contributions during 1950		24,132.69
		229,404.33			229,404.33

ESTIMATES AND ACTUAL INCOME STATEMENT FOR 1950

	Estimate Rs. Cts.	Actual Income Rs. Cts.	Excess Rs. Cts.	Deficit Rs. Cts.	
Cess Collections	862,400.00	1,491,307.60	628,907.60		Under Estimate
Interest	20,700.00	38,230.27	17,530.27		Larger Investments
Sale of Publications	1,000.00	1,049.32	49.32		——
Profit from Dartonfield	3,905.00	69,432.92	65,527.92		Higher Prices realised
Profit from Nivitigalakele	11,414.00	110,686.29	99,272.29		Higher Prices realised
Profit from Hedigalla (loss)	942.00	3,002.27	3,944.27		Higher prices realised on rubber and larger food crops sold
Sundry Receipts	2,500.00	3,451.72	951.72		More planting material sold by S.H. Department
Government Grant for Smallholdings Work	164,564.00	164,564.00	——		——

STATEMENT OF EXCESSES AND SAVINGS ON VOTES
EXPENDITURE

Head of Estimate	Account	Estimate	Capital	Revenue	Excess	Saving	Remarks
1.	ADMINISTRATION OF THE BOARD :—						
	Travelling Expenses of Board Members	3,000.00		3,261.31	261.31		More meetings held
2.	EMOLUMENTS OF SENIOR SCIENTIFIC STAFF :—	121,914.00		107,689.42		14,224.58	Non employment of full Staff
3.	EMOLUMENTS OF JUNIOR SCIENTIFIC STAFF :—	32,619.00		21,236.13		11,382.87	Non employment of full Staff
4.	LIBRARY & PUBLICATIONS :—						
	A. Library	4,700.00		5,776.05	1,076.05		Binding charges and new journals procured
	B. Publications	3,500.00		1,924.37		1,575.63	Fewer publications issued
5.	SMALLHOLDINGS WORK						
	A–F & H. Emoluments to Staff	160,762.00		147,764.13		12,997.87	Non employment of full Staff
	G & I–J Travelling and Gen. Exps.	83,045.00		52,465.88		30,579.12	Non employment of full Staff
6.	LABORATORY :—						
	A. Equipment and Working Expenses	23,561.00	24,811.87	5,779.93	7,030.80	——	Under Estimate
	B. Furniture R'mts	100.00		65.71		34.29	Economies
7.	FIELD & FACTORY EXPERIMENTS :—						
	A. Field Expmts.	4,010.00		3,862.97		147.03	Over Estimate
	B. Factory Equipment	4,746.00		486.85		4,259.15	Experiments not undertaken

STATEMENT OF EXCESSES AND SAVINGS ON VOTES—*(Contd.)*

EXPENDITURE

Head of Estimate	Account	Estimate	Capital	Revenue	Excess	Saving	Remarks
8.	OFFICE :—						
	A-C Emoluments of Office Staff	24,986.00		23,414.25		1,571.75	Over Estimate
	D. Stnry. & Office Equipment	4,000.00		1,714.14		2,285.86	Over Estimate
	E. Postages & T'grs	3,000.00		1,850.52		1,149.48	Over Estimate
	F. Advertising	1,000.00		1,403.34	403.34	——	More vacancies and wider range of advertisements
	G. Telephone	1,200.00		1,266.80	66.80	——	Shifting one extension
	H. Audit	1,200.00		1,200.00	——	——	——
9.	TRAVELLING EXPENSES OF STAFF :—	12,000.00		14,504.29	2,504.29		More travelling undertaken
10.	MAINTENANCE OF BUILDINGS, WATER & POWER SUPPLY AND STATION WAGGON :—						
	A. Gen. Buildings	500.00		194.10		305.90	Less work undertaken
	B. Bungalows	10,000.00		11,005.11	1,005.11		Wiring of S.S. bungalows, factory and laboratory
	C. Water & Power Supply	4,000.00		4,729.60	729.60		Unexpected repairs to pumps and engine
	D. F'niture Replacements	1,000.00		396.94		603.06	Over Estimate
	E. Station Waggon	2,500.00		3,227.11	727.11		Unexpected Repairs to Waggon.

STATEMENT OF EXCESSES AND SAVINGS ON VOTES—*(Contd.)*

EXPENDITURE

Head of Estimate	Account	Estimate	Capital	Revenue	Excess	Saving	Remarks
11.	MISCELLANEOUS ITEMS SHARED WITH ESTATES:						
	A. Dartonfield Gen. Charges	29,124.00		27,130.26		1,993.74	Over Estimate
	B. Nivitigalakele General Charges	15,260.00		12,863.70		2,396.30	Over Estimate
	C. Hedigalla Gen. Charges	11,517.00		10,228.68		1,288.32	Over Estimate
	D. Upkeep of Roads and Grounds	1,125.00		1,004.88		102.12	Over Estimate
	E. Factory Upkeep	2,100.00		3,509.99	1,409.99		Unexpected Repairs to Motors and Mills
	F. Power Supply	10,500.00		111,922.41	1,422.41		Increased cost of oil.
12.	CONTINGENCIES :—						
	A. Contribution to London Advisory Committee	27,000.00		26,713.29		286.71	Difference in Exchange
	B. General Charges	1,000.00		1,121.66	121.66		Unanticipated legal fees.
	C. Insurance Chgs.	5,500.00		5,109.70		390.30	Over Estimate
	D. Staff Prov. Fund	54,500.00		42,257.96		12,242.04	Non employment of full Staff
	E. Passages	5,000.00		5,000.00			
	F. Entmt. Allow.	250.00		492.00	242.00		More visitors entertained than in previous years
	G-H. War Allowance to Staff	57,718.00		39,078.00		18,640.00	Non employment of full Staff
	I. Contribution to Medical Fund	3,600.00		2,523.00		1,077.00	Non employment of full Staff
13.	DEPRECIATION :	30,500.00		31,930.42	1,430.42	——	Over Estimate

RUBBER RESEARCH SCHEME (CEYLON)

STATEMENT OF EXCESSES AND SAVINGS ON VOTES—(*Contd.*)

EXPENDITURE

Head of Estimate	Account	Estimate	Capital	Revenue	Excess	Saving	Remarks
15.	CAPITAL ACCOUNT :—						
	A. Upkeep of Dartonfield Immature Areas	2,300.00	2,152.54			147.46	Over Estimate
	B. Replanting 30 acres (Dartonfield)	11,739.00	11,980.45		241.45		Under Estimate
	C. Upkeep of Nivitigalakele Immature Areas	3,533.00	2,313.92			1,219.08	Over Estimate
	D. Upkeep of Hedigalla Immature Areas	18,053.00	13,051.48			5,001.52	Over Estimate
	E. Hedigalla 1950 New Planting (20 acres)	7,447.00	5,073.63			2,373.37	Over Estimate
	F. Junior Staff Bungalow at Dartonfield	11,000.00	560.00			10,440.00	Work not undertaken
	G. Junior Staff Recreation Club	10,000.00	325.00			9,675.00	Non completion of work
	H. Renovating Buildings	15,500.00	18,715.26		3,215.26		More work undertaken
	I. Water-borne-sanitation for Junior Staff Bungalows	8,000.00	7,864.38			135.62	Work not complete
	J. Hedigalla Water Supply	2,000.00	——			2,000.00	Work not undertaken
	K. Water Tanks for Assistant Superintendent's and S.H. P.O's Bungalows	600.00	473.15			126.85	Work not complete
	L. Electric lights for J.S. bungalows at Nivitigalakele	3,500.00	——			3,500.00	Work not undertaken

STATEMENT OF EXCESSES AND SAVINGS ON VOTES—(*Contd.*)

EXPENDITURE

Head of Estimate	Account	Estimate	Capital	Revenue	Excess	Saving	Remarks
	M. Furniture for Superintendent's Bungalow (Dartonfield)	5,000.00	——			5,000.00	Furniture not purchased due to non employment of Superintendent
	N. Renovating old furniture in Staff bungalows	3,000.00	——			3,000.00	Work not undertaken
	O. Hedigalla Cart Road Extension	10,000.00	——			10,000.00	Work not undertaken
	P. Metalling Factory premises Dartonfield	1,000.00	——			1,000.00	Work not undertaken
	Q. Smokehouse for Hedigalla	5,000.00	——			5,000.00	Work not undertaken
	R. Pair Handrollers & Coagulating Pans–Hedigalla	2,150.00	——			2,150.00	Handrollers not purchased
	S. Oil Renovator for Dartonfield Factory	——	1,775.30		1,775.30		Not estimated for
	T. Purchase of New Typewriter	950.00	——			950.00	Purchase deferred till 1951

ESTIMATES FOR 1952

(Adopted by the Board, November 5th, 1951).

		Rs.
1.	Cess Collections	1,232,000
2.	Government Grant for Smallholdings Work ...	189,060
3.	Interest	94,000
4.	Sale of Publications	1,000
5.	Profit from Dartonfield Group Working	90,069
6.	**Sundry Receipts :—**	
	A. General Rs. 2,500	
	B. Eletcric Lights ,, 1,500	4,000
		Rs. 1,610,210

ESTIMATE OF EXPENDITURE FOR 1952

		Rs.	Rs.
1.	**Administration of the Board :—**		
	Travelling Expenses of Board Members		4,500
2.	**Personal Emoluments :—**		
	Senior Scientific Staff	129,251	
	Junior Scientific Staff	30,432	159,683
4.	**Library and Publications :—**		
	A. Library	5,000	
	B. Publications	5,000	10,000
5.	**Smallholdings Department :—**		
	Salaries and Allowances	186,168	
	Travelling and General Expenses ...	91,310	277,478
6.	**Laboratory :—**		
	A. Equipment and Working Expenses ...	25,000	
	B, Furniture Replacements	500	25,500
7.	**Field and Factory Experiments :—**		
	A. Field Experiments	15,145	
	B. Factory Experiments	16,000	31,145
8.	**Office :—**		
	A. Salaries of Office Staff	28,030	
	B. Stationery and Office Equipment ...	4,500	
	C. Postages and Telegrams	3,000	
	D. Advertising	1,000	
	E. Telephone	3,200	
	F. Audit	1,600	41,330
	Carried over		549,636

		Rs.	Rs.
	Brougt forward		549,636
9.	**Travelling Expenses of Staff :—**		
	Officers' Expenses		18,000
10.	**Maintenance of Buildings :—**		
	A. General Buildings	1,500	
	B. Bungalows	8,000	
	C. Water and Power Supply ...	5,000	
	D. Bungalow Furniture Replacements ...	3,000	
	E. Motor Vehicles	5,500	23,000
11.	**Miscellaneous items shared with Estates :—**		
	A. Dartonfield Group General Charges ...	81,426	
	B. Upkeep of Roads and Grounds ...	1,875	
	C. Upkeep of Bungalow Premises ...	7,800	
	D. Factory Upkeep	9,975	
	E. Power Supply	9,970	111,046
12.	**Other Charges :—**		
	A. Contribution to London Advisory Committee	31,200	
	B. Contingencies	1,500	
	C. Insurance Charges	8,500	
	D. Staff Provident Fund	63,500	
	E. Passages	15,000	
	F. Entertainment Allowance ...	500	
	G. Dearness Allowance to Staff ...	90,000	
	H. Contribution to Medical Fund ...	3,600	
	I. Social Services	2,000	215,800
13.	**Depreciation**		42,000
		Total Rs	959,482

CAPITAL ACCOUNT.

Agricultural Development :—		
Upkeep of Dartonfield Group Immature Areas	60,996	
Planting coffee in 1949 Clearing Hedigalla ...	4,117	
Replanting 35 acres Dartonfield	18,069	
Planting 75 acres Heligalla	37,438	120,620
Buildings :—		
6 double labourers' cottages and latrines as per D.M. & S.S. type plan No. 91	39,000	
6 Water-seal latrines	1,500	
School and creche at Hedigalla	12,500	
School Master's Quarters and Co-operative Store at Hedigalla	16,000	
Converting Engine Driver's Quarters into workshop	4,500	
Indoor sanitation for J. S. Bungalows at Nivitigalakele and Hedigalla	7,000	
Alterations to Estate Office	1,100	
Renovating Dartonfield and Nivitigalakele Conductors' bungalows	3,500	
Extra doors to 10 J.S. Bungalows	500	
Converting Store rooms in 15 J.S. Bungalows to Dining rooms	7,500	93,100
Carried over		213,720

	Rs.	Rs.
Brougt forward		213,720
Machinery and Equipment :—		
Equipment for Chemist	44,000	
Electrical calculating machine for Botany Department	4,000	
Workshop Equipment :— Rs.		
Workshop table ... 1,750		
Electric Drilling machine ... 2,500		
Electric double sided grinding wheel 1,000		
Foot driven sand wheel ... 250		
Labour and material for erecting above 2,500	8,000	
1 Scrap washer for factory	20,000	
2 Library book cases	600	
1 Typewriter for S.H. Department ...	800	77,400
Water and Power Supply :—		
Altering route of power line to J.S. Bungalows	2,000	
Transferring battery to present workshop	2,500	
Underground cable to Senior Staff Bungalows	6,500	
Augmenting factory water supply (dam and piping)	2,000	13,000
Roads :—		
Extension of Hedigalla cart Road—½ mile ...	10,000	
Widening road to 7½ acre field (Dartonfield) ...	2,500	
1 Cattle bridge, Dartonfield	3,400	
Road to new bungalows at Dartonfield ...	1,000	16,900
		Rs. 321,020

SUMMARY

Income		1,610,129	
Expenditure :—			
Revenue ...	Rs. 959,482		
Capital ...	„ 321,020	1,280,502	
		Balance	Rs. 329,627

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H. W. CAVE & CO., LTD.,
COLOMBO.